

3shape ▶



3Shape Orthodontics System 2010 User Manual

3Shape Ortho System 2010

Introduction

The 3Shape Ortho System is a unique combination of 3Shape's expertise in 3D scanning and 3D software for the creation of accurate 3D models of real orthodontics cases applied to treatment planning, appliance manufacturing and case analysis.

3Shape Ortho System supports multiple languages throughout the applications: English, German, French, Italian, Spanish, Portuguese, Japanese, and Mandarin Chinese.

This manual describes the Ortho System, which consists of three distinct programs for the following applications :

- Creating digital study models: ScanItOrthodontics
- Analysis and treatment planning based on the 3D scanned data: OrthoAnalyzer
- Setup of parameters and analyses for ScanIt Orthodontics and OrthoAnalyzer: Ortho Control Panel

If you have acquired a license for OrthoAnalyzer only and your 3D models are created by a third-party, you can disregard the ScanIt Orthodontics section of the manual.

The Software described in the manual is covered by the Terms and Conditions according to the End User License Agreement issued either by 3Shape A/S or by 3Shape A/S Partners from whom you may have acquired the Partner version software.

Should you have questions regarding the content of a particular software version or system configuration, please contact your local 3Shape solution provider.

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ScanIt Orthodontics

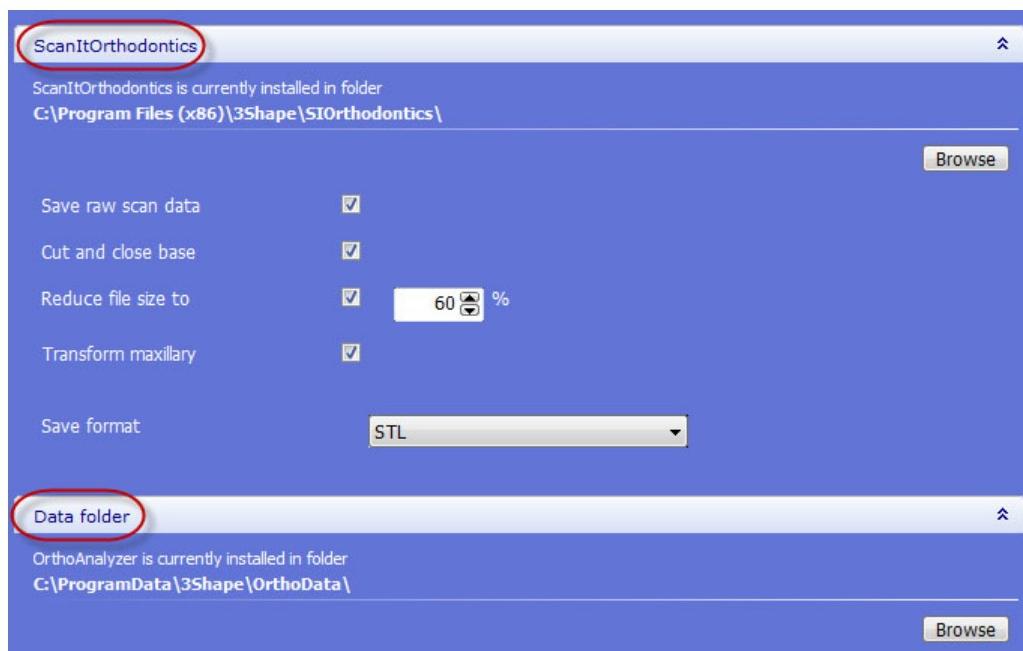
ScanItOrthodontics™ is an application designed for the fast and reliable 3D scanning of orthodontic models with the help of the 3Shape R700™ Scanner.

The R700™ Scanner represents the next generation of scanning technology, and is optimized for the scanning of plaster casts at the orthodontic practice or laboratory.

This manual will introduce you to the ScanItOrthodontics™ application and R700™ Scanner and will guide you through the main steps of 3D scanning with the help of our software.

1 Ortho Control Panel

Ortho Control Panel™ is where you can customize all parameters used in ScanItOrthodontics (and OrthoAnalyzer™). It is the first thing you should open after the installation. The parts directly relevant for ScanItOrthodontics are shown in the image and described below (*Ortho Control Panel -> System Settings*):



- **ScanItOrthodontics is currently installed in folder** – If no folder is specified here, please use the **Browse** button to select the folder where ScanItOrthodontics was installed. Usually, this will be *C:\Program Files\3Shape\SIOrthodontics*.
- **Save raw scan data** – If checked, the raw scanner output will be saved for each scanning job. This allows old orders to be re-processed without re-scanning. So for example, if you are unhappy with the resolution of models for a given patient, you can change the **Reduce file size to** value (see below) and then re-process the corresponding order. However, these files are quite large (typically 25MB for a single scan).
- **Cut and close base** – If checked, a neat horizontal cut will be made near the bottom of each model, and the bottom will then be closed. It results in an air-tight model with a cleaner visual appearance however, this leads to a slightly increased processing time; moreover, this feature is not always desirable (e.g. if you are designing a virtual base for your scanned models).
- **Reduce file size to** – The option lets you specify the amount of the file size reduction at a cost of reduced detailization. The lower the value, the lower the resolution of the final model where some details may get smoothed out.
- **Transform maxillary** – When checked, transforms the upper model if only the maxillary model is scanned.

- **Save format:**

STL: Standard open format.

DCM: 3Shape compressed format. Gives smaller files, but not supported by external software.

PTS: Only the raw scan points are saved. However, the points will still be processed (temporarily) in order to allow alignment.

PTSCyra: Special point cloud format (for very special cases only).

VRML: Is an alternative format for saving models. It is primarily used for saving face scan models in 3Shape software.

- **Data folder** – The folder specified here is where all scanned models and patient data will be stored. Use the **Browse** button to select your favorite location. This is also the folder where OrthoAnalyzer will read and store its data. Note that sub-folders will be created automatically for each patient and each scanning job, so you do not have to worry about the **Data** folder getting too cluttered.

2 R700 Scanner

The introduction of the new advanced 3Shape R700 scanner builds up on 3Shape's scanning expertise and is optimized for scanning of dental gypsum models up to 40% faster and with greater details than 3Shape's previous R640 scanner. The R700 scanner guarantees superior scan results without compromising the ease of use.



The R700 allows you also to scan models directly as poured from the impression tray without the need for a base.

Easy and quick object fixation followed by a few clicks in the scanning software makes the scanner easy to use and require a minimal amount of training.

The patient's original occlusion is registered using the provided 2-cast fixture and can easily be altered on-screen.

The scanner employs a unique 2-camera and 3-axis motion system, which results in unrivaled accuracy in object geometry acquisition.

2.1 Unpacking and Installation

The R700 scanner is packed together with all the accessories needed to connect it to the scan-server PC and operate. Special packaging materials made from transport security foam are used to protect the scanner and accessories during transportation. When unpacking, please verify the package contents and contact your 3shape re-seller's customer support if any part is found missing or defective.

Content of the box:

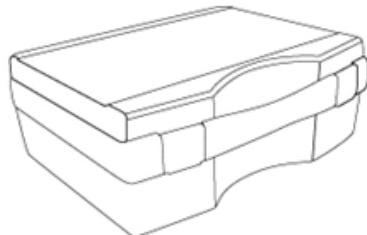
R700 Scanner



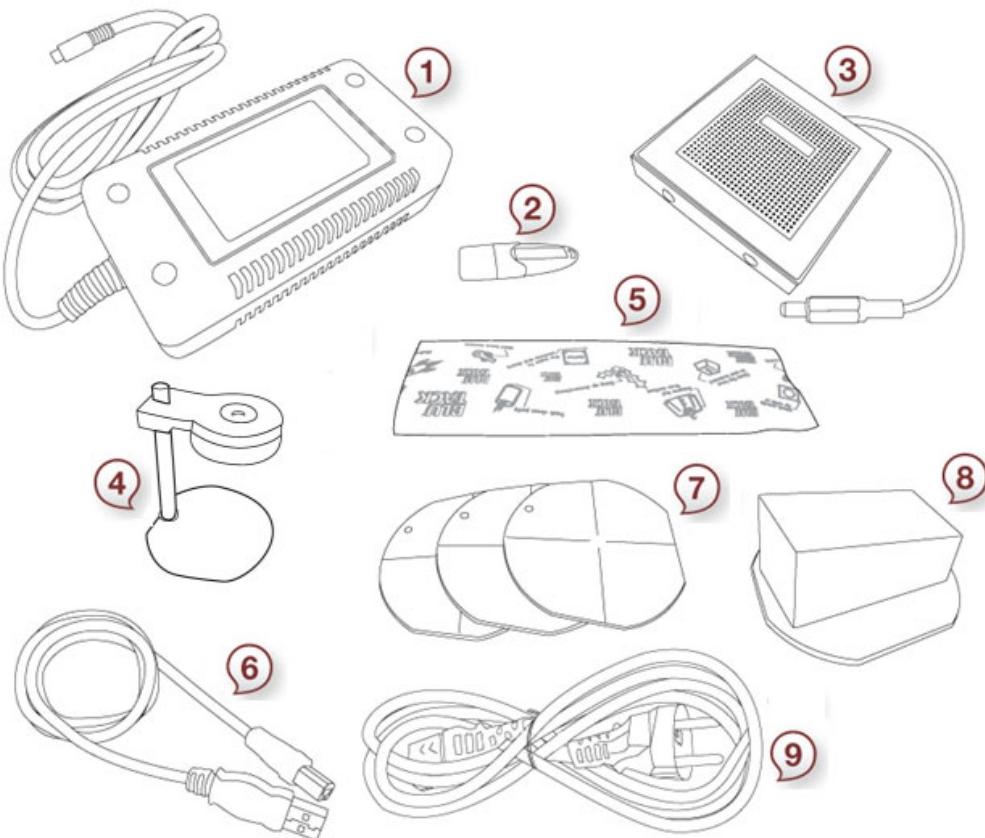
User Manual



Calibration box



The calibration box contains:



1. Power supply
2. USB dongle key (red or blue)
3. Calibration "dot plate"
4. 2-Cast fixture
5. Scanning clay
6. USB cable
7. 3 x Scanning plates
8. Calibration "Square"
9. Power cord

The R700 scanner is tested, sold and delivered together with an approved PC.

3Shape does not guarantee the functioning of the R700 if:

- third party software is installed on the ScanServer PC;
- third party computer peripherals are installed (e.g. USB flash key, WLAN adapters);

- the software is installed on a different PC.



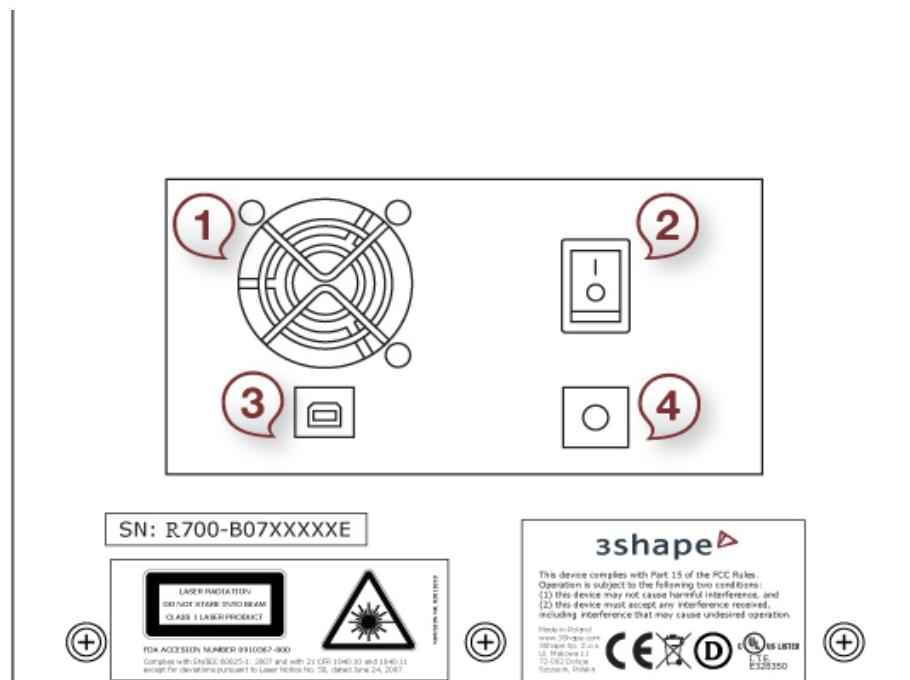
Note! The default Windows™ user name and password for the 3Shape PC is "scan".

2.2 ScanServer

The 3Shape ScanServer application program works as a software driver to bridge the gap between the scanner hardware and the scanning applications e.g., ScanItOrthodontics.

Therefore, its function is to provide a low-level hardware communication with the scanner and to output the 3D point cloud based on the scanner cameras input. Whenever a scan is to be performed, the ScanServer needs to be "ON" and ready for operation.

Connect your scanner to the PC using the USB cable. USB (Universal Serial Bus) cables are standard data transmission cables. The flat end of the cable is plugged into the computer, the square end into the scanner. The USB cable should be plugged into one of the rear ports of the computer.



Rear of the R700:

- | | |
|-------------|----------------------|
| 1. Fan | 2. Power switch |
| 3. USB port | 4. Power supply port |

Connect the power supply to the scanner power supply port and plug the power supply to the power outlet. Use standard precaution when operating the scanner power supply.

Caution! We strongly recommend that both the scanner power supply and scan-server PC power cable are plugged into a UPS unit (rather than directly into the mains outlet) to prevent work losses and damages to the equipment.



With the launch of ScanServer, an icon with a flashing green light appears in the system tray. When this green light becomes steady, the ScanServer is ready for operation.

Launch the ScanServer application only after having plugged the scanner to the scan-server PC and switching the scanner "ON"; otherwise, the following error message will pop up: "*No scanner is connected to the PC by USB. Please check the power and USB cable and try again.*"

2.3 Scanner Calibration

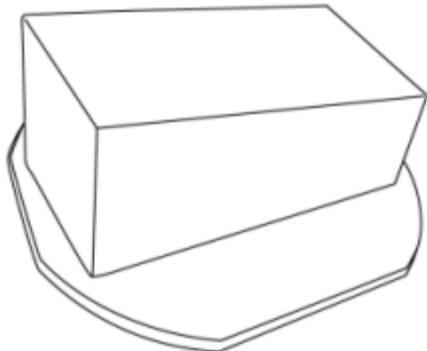
By calibrating the scanner the internal scanner geometry and camera parameters are calculated. It is recommended to calibrate the scanner each time it is moved or at least twice a week. However, if the scanner is placed on a stable table and at a constant temperature, the calibration intervals can be increased. A calibration is always required when a scanner is first unpacked.

An indication of a poorly calibrated scanner is a scanned model with a rough surface. When this happens, check if it is a recurrent problem, as it might be attributed to the object not properly placed on the fixture, or the fixture is not firmly fixed to the black interface plate. Try scanning different objects, and in particular objects of different materials. If the problem persists, please contact your 3Shape re-seller's customer support. No other maintenance besides calibration is required for the scanner.

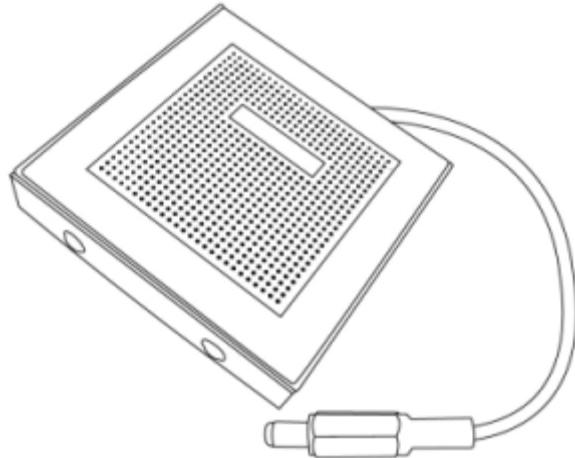
Caution! Beware that the scanner is a precision mechanical device sensitive to temperature and power variations as well as vibrations.

The calibration is performed using the "dot plate" calibration object and the "square calibration object" supplied with your scanner (see images below). The procedure is simple and nearly completely automatic:

1. Click on the **ScanServer** icon in the system tray, and the *ScanServer* window will pop-up. Press **Calibrate scanner** button on the *ScanServer* window in the lower right part of the screen. You will be prompted for a password, which is "**local**". The reason for the password is to keep unauthorized personnel from trying to calibrate the scanner.
2. A new window opens. Follow the detailed instructions in this window, which will guide you through the full calibration process.



Calibration "square"



Calibration "dot plate"

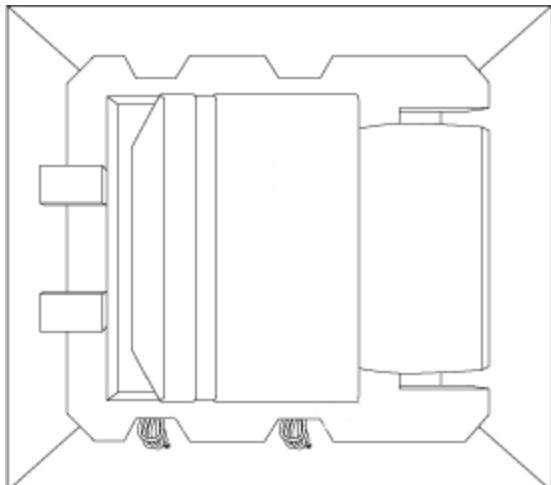
2.4 Scanner Transportation

In order to protect the scanner against any possible damage during transportation, it is necessary to use the original packaging materials and boxes.

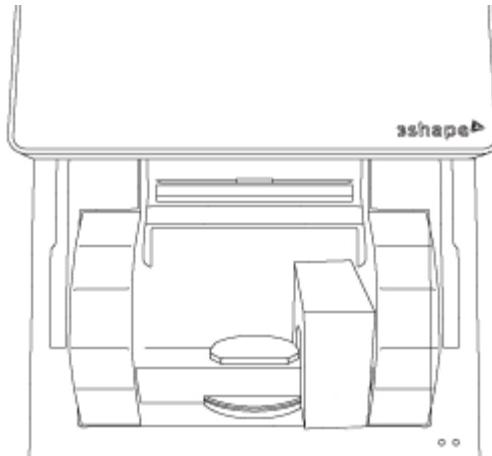
Caution! The swing axis of the scanner should be secured each time the scanner is transported using the swing protection foam. If the original packing materials have been lost or damaged, a new packaging set can be ordered from 3Shape.

Please follow the steps below to perform a successful transportation:

1. Press the **Transport Position** button in the *ScanServer* application. The **Transport Position** button cannot be pressed when the calibration wizard is displayed.
2. Switch off the PC and disconnect the scanner.
3. Fasten the swing axis using the protection foam.
4. Place the scanner into the original box using the original foam.



The scanner is packed correctly



The swing axis foam is packed correctly

3 Performing a Scanning Job

When everything is setup and ready for scanning, you start the application.

ScanItOrthodontics is started by double-clicking the ScanItOrthodontics desktop icon or via the Windows™ Start menu: *Start -> All Programs -> 3Shape -> 3Shape ScanItOrthodontics*.

3.1 Patient Information Form

When you open ScanItOrthodontics you are immediately asked to fill out a *New patient info* form (except if you are in the **Post-processing** mode – please refer to the [Processing on a Second PC](#) chapter for more details).

The only required field to fill out is the **Patient ID**. Once this is filled out, click **Create** to proceed. The *New patient model set info* form appears (see the [Model Set Form](#) chapter).

The **Browse** button loads the *Open patient case* form where you can search for model sets and load them into ScanItOrthodontics.

The screenshot shows a Windows-style dialog box titled "New patient info". The main section is labeled "Patient information". It contains the following fields:

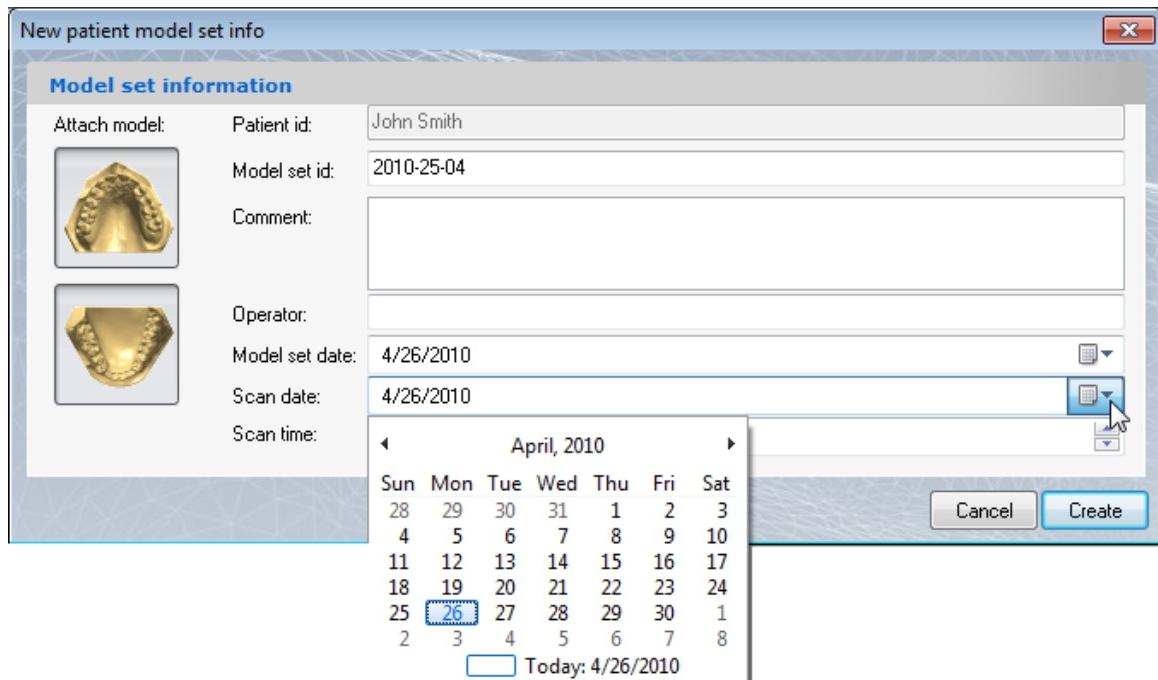
Patient id:	John Smith
SSN:	
First name:	
Last name:	
Address:	
City:	
Country:	
Clinic:	

At the bottom of the dialog are three buttons: "Browse", "Cancel", and "Create".

For more information please refer to the [Loading the Existing Orders](#) chapter.

3.2 Model Set Form

Once the *New patient info* form has been filled out, there appears a *New patient model set info* form. In the appeared form enter the **Model set ID** information, which is used to identify the scanning job you are about to perform for the current patient:



Click on the drop-down menus in the **Model set date** and **Scan date** fields to use the calendar and choose a date (see image above).

Notice the two model pictures on the left of the form. Clicking on one of these unselects that model, meaning it will not be included in the scanning job.

A selected model is
yellow (by default)



An unselected model is
gray



When you have entered the model set information, click **Create** to proceed.

Now that both the patient information and model set information have been filled out, a folder called "*Data folder/Patient_ID/Model_Set_ID/*" has been automatically created (recall that **Data** folder is specified in the Control Panel). All scan data for the current scanning job will be automatically saved to this folder. It is important to note that patient and model set information forms should only be filled out from a scanning PC (i.e. not from a PC in the **Post-processing** mode – please see the [Processing on a Second PC](#) chapter for details).



You can create a new patient at any time since the **Create new order** button (image to the left) is available throughout the whole scanning process.

3.3 Scanning Process

Now that all relevant information has been entered, you will be guided through the steps needed to scan all models. Essentially, the only thing you need to ensure is that the models are inserted in the correct way into the scanner:

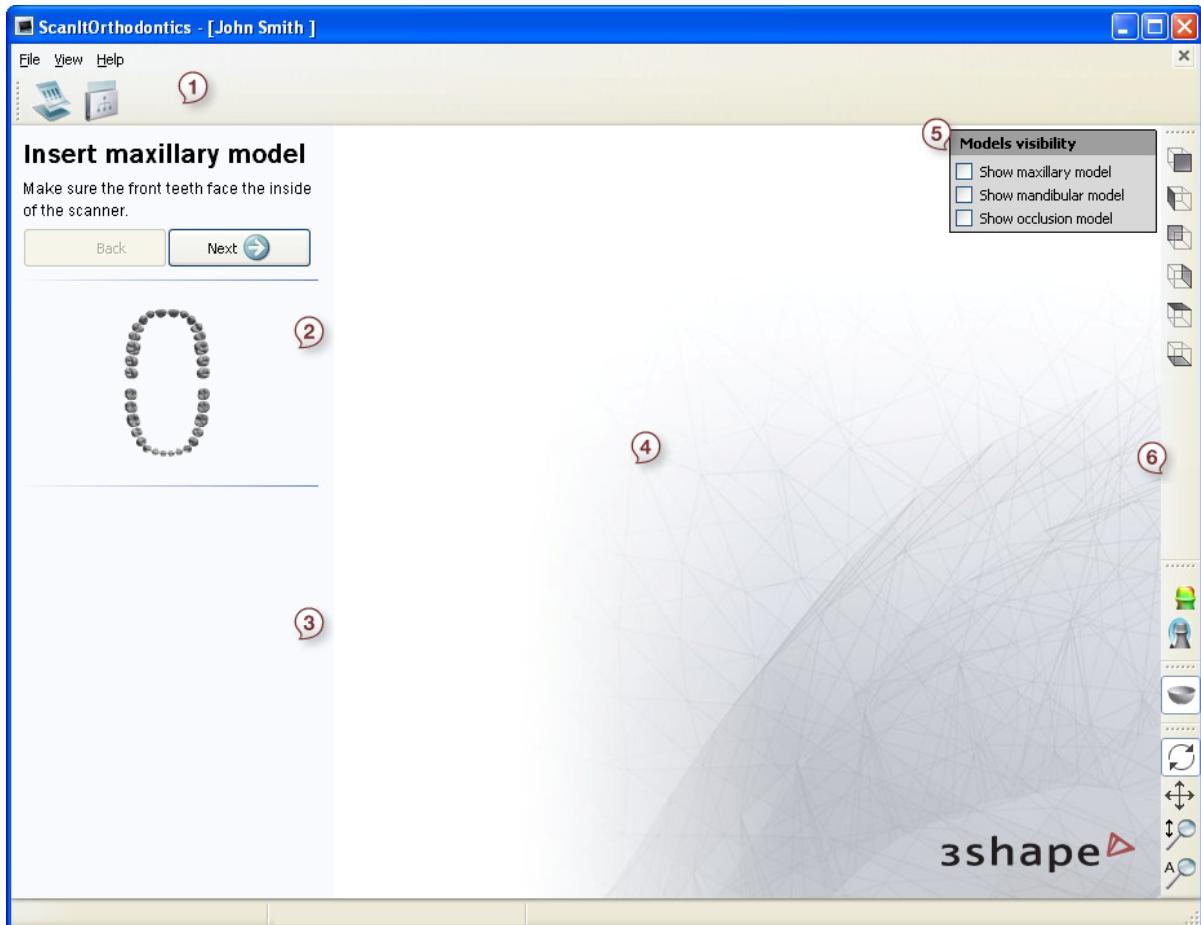
Note! The front teeth should always face the inside of the scanner, and there should be approximately 1cm of blue clay underneath the model, holding it firmly in place.

A typical scanning job will consist of three scans: the maxillary model, the mandibular model, and the occlusion model (which consists of the maxillary on top of the mandibular, in correct occlusion, e.g. using 3Shape's specially designed fixture). After all three scans are complete, you will be asked to help the software in performing the alignment.

3.3.1 Scan Maxilla

After you have filled out the *New Patient info* form and the *New patient model set info* form, the main ScanItOrthodontics window opens up offering you to insert the maxillary model for scanning.

Insert the model correctly and click **Next**.



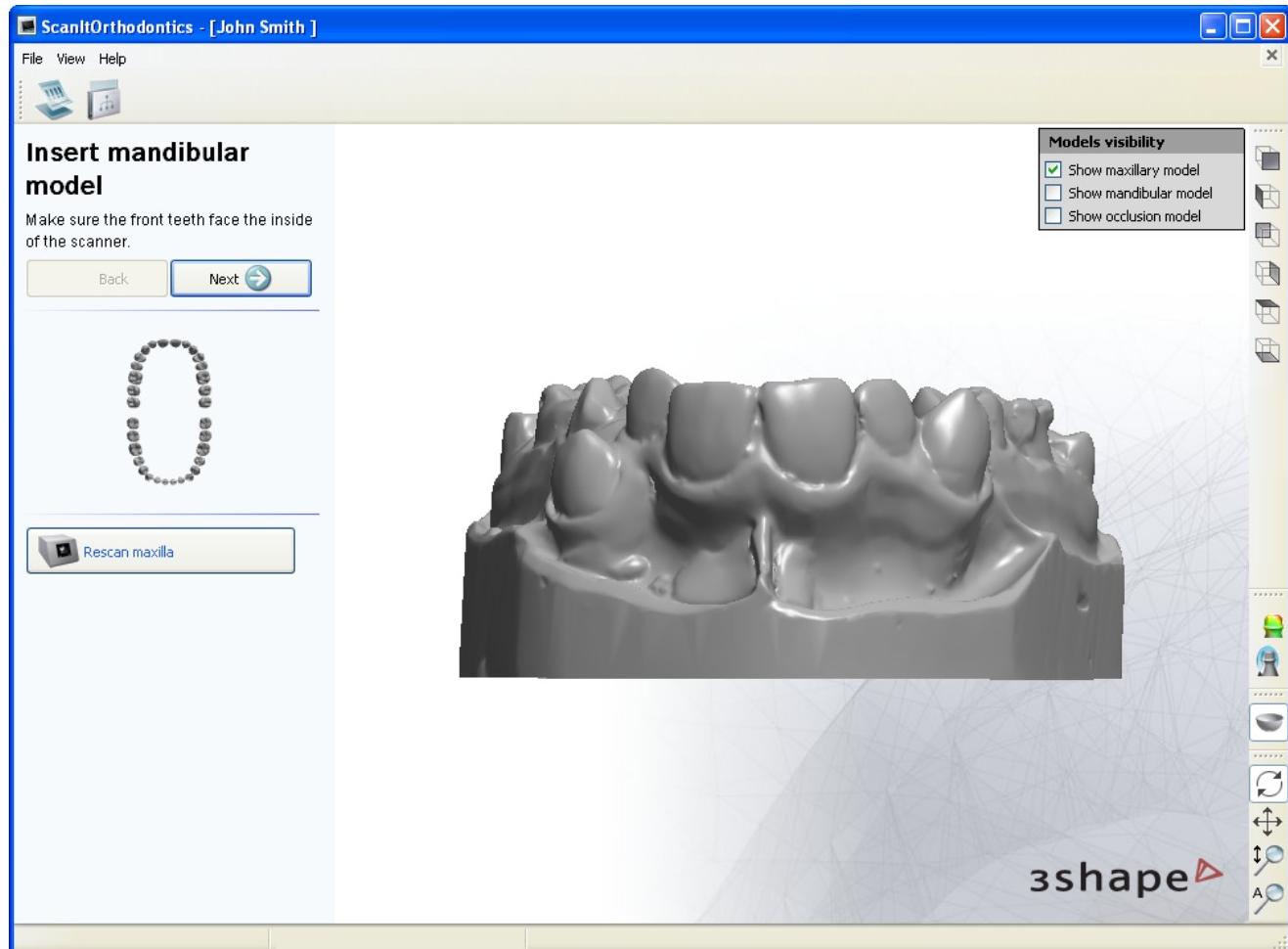
1. Main toolbar
2. Overview toolbar
3. Function panel
4. Session window
5. Models visibility
6. Visualization toolbar

3.3.2 Scan Mandible

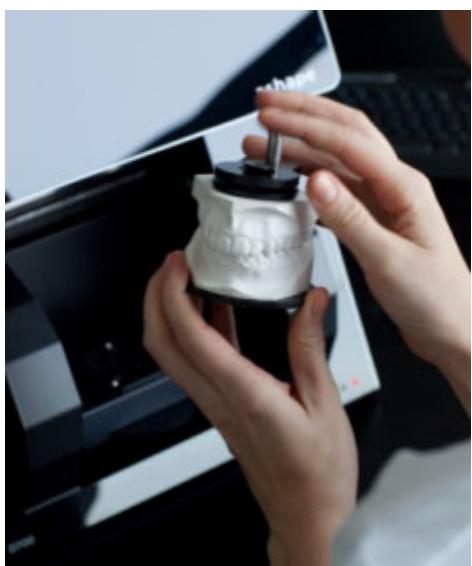
After the maxillary model has been scanned, the program asks you to insert the mandibular model.

Note that the **Rescan maxilla** button has appeared in the Function panel so you can rescan the maxillary model if necessary.

Insert the mandibular model correctly and click **Next**.



3.3.3 Scan Occlusion

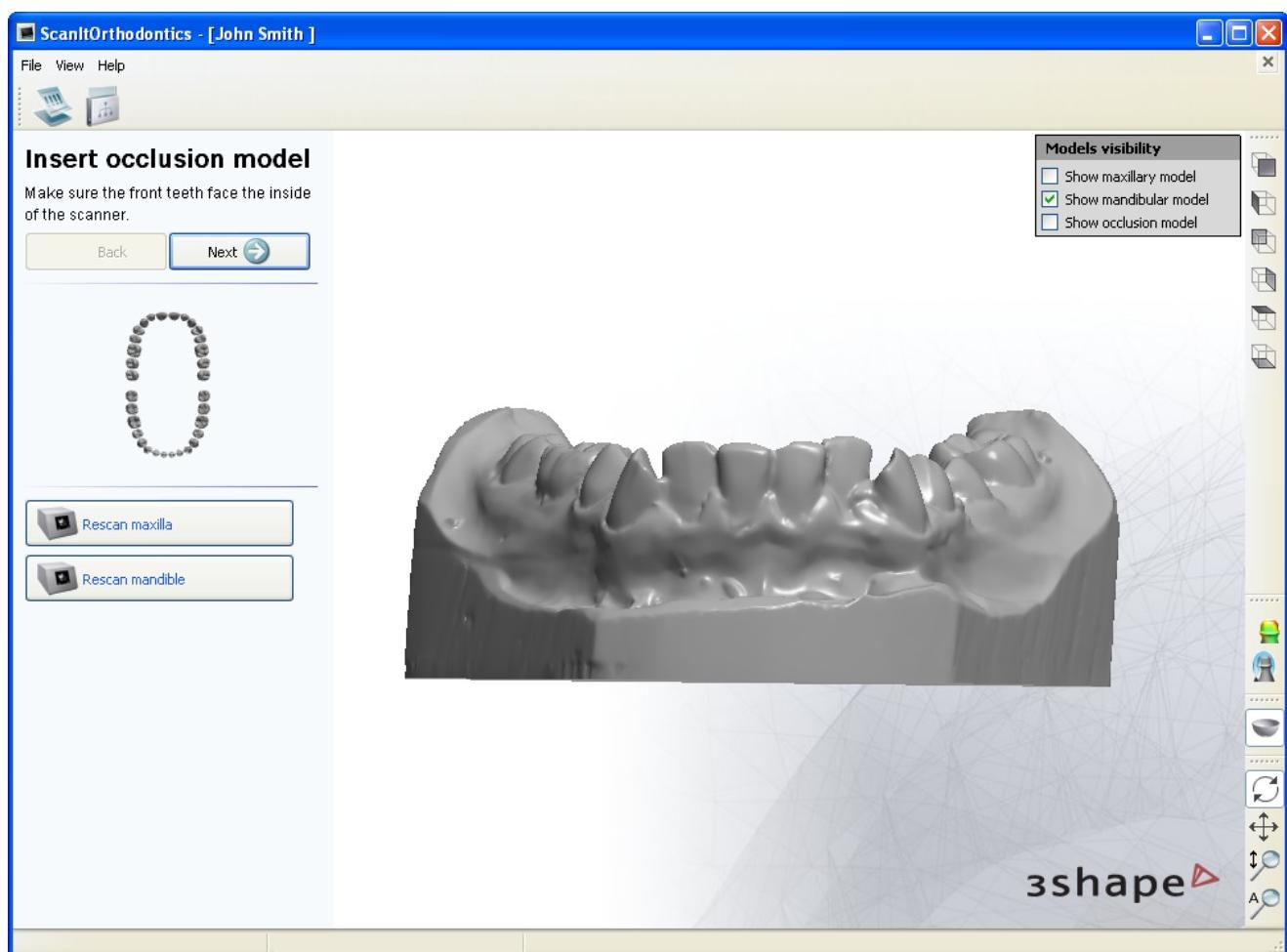


After the mandibular model has been scanned, the application offers you to insert the occlusion model, i.e. both the maxillary and mandibular models together, using the provided 2-cast fixture.

Put the models in occlusion (potentially using a wax bite if one is necessary) and close the fixture on the two models as illustrated in the image to the left. Insert the fixture with the models' front teeth facing the inside of the scanner. After the occlusion scan, press the fixture's top button to release the models.

Note that the **Rescan mandible** button has appeared in the Function panel so you can rescan the mandibular model if necessary.

Insert the occlusion correctly and click **Next**.



3.3.4 Model Alignment

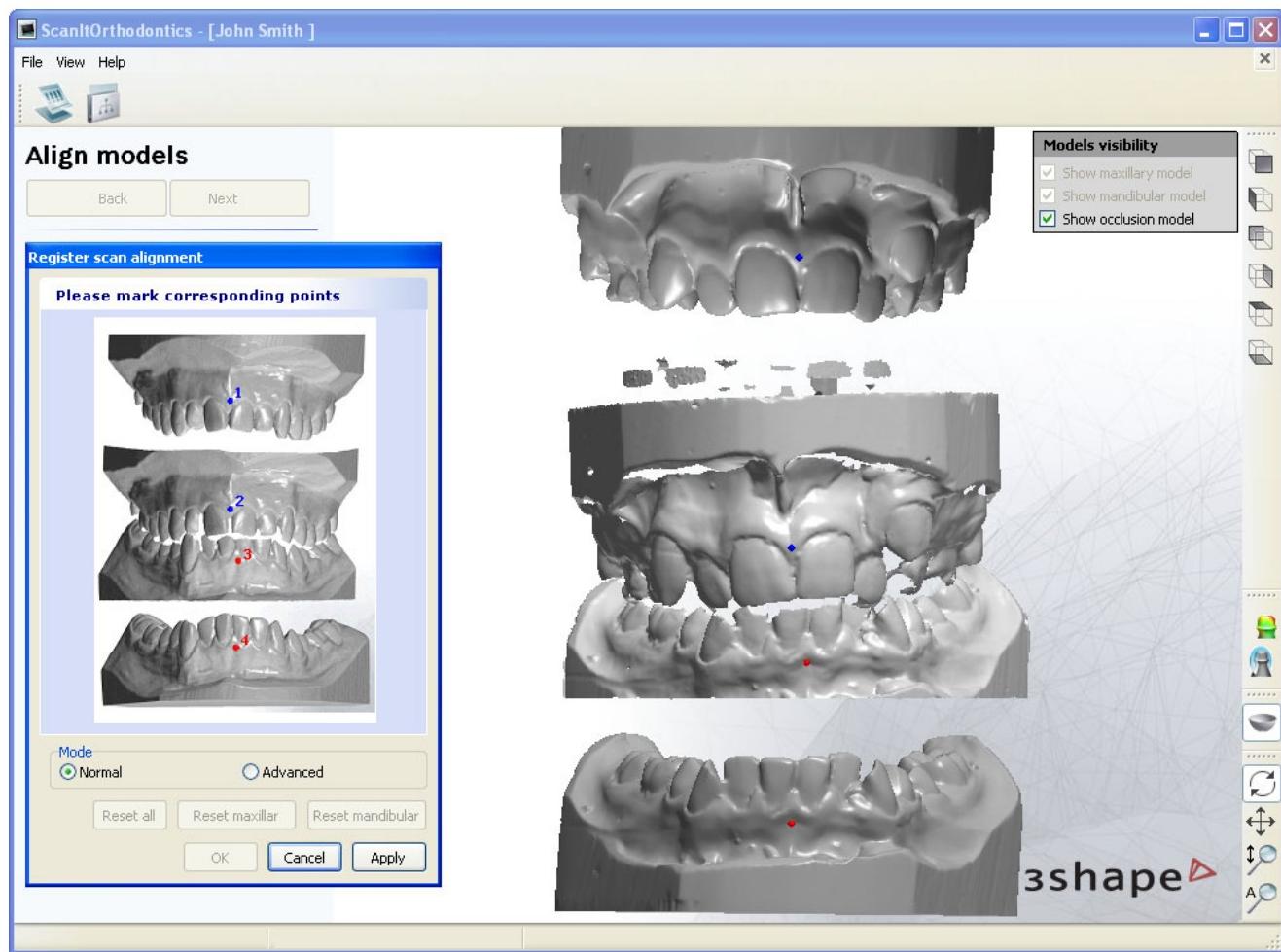
After scanning has been finished, the program displays all three scans and asks you to align the models. There are two ways to do it: **Normal** and **Advanced**. You can choose either of them by selecting the corresponding radio button (see image below).

- **Normal method**

The alignment is performed by placing the corresponding points on the models. The hints on how to place the points correctly are illustrated in the *Register scan alignment* form (see image below).

Click on the maxillary model, somewhere near the front teeth (try to avoid flat areas). Then click on the corresponding area on the occlusion model. Do the same thing for the mandibular model, thus resulting in 4 points. You can change the position of a point by dragging it (click and hold down the mouse).

If you are satisfied with the result, click **Apply** to perform the alignment. Once the alignment is complete, you can click **OK** to accept it, or click one of the **Reset** buttons to try again using different points. You can use the *Models visibility* form in the upper right corner to show the occlusion model at any time – this can help you evaluate the quality of the alignment, as the occlusion model is of a different color.



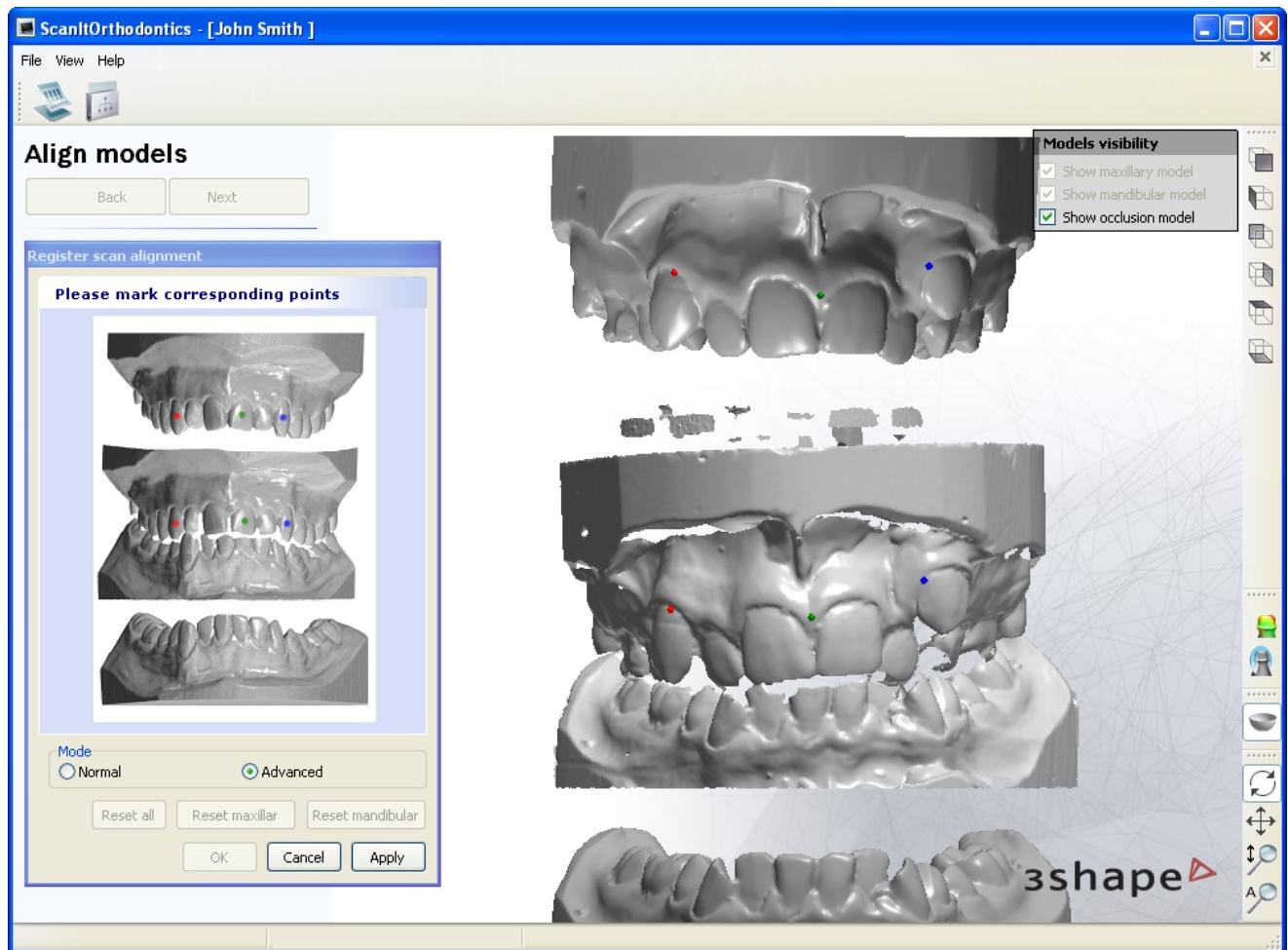
Note that there is a **2D cross-section** tool, as well as the **Difference map**, in the Visualization toolbar. These tools (particularly the **2D cross-section**) can help you evaluate the quality of the alignment.

- **Advanced method**

If for some reason the **Normal** alignment method does not produce a satisfactory result, you can click **Reset all** and switch to the **Advanced** mode. With this method, you must set 3 points on each model, as illustrated in the image below. The order of operations is:

1. Set 3 points on maxillary model.
2. Set 3 corresponding points on occlusion model.
3. Click **Apply**.
4. Set 3 points on lower part of occlusion model.
5. Set 3 corresponding points on mandibular model.
6. Click **Apply**.

The hints on how to place the points correctly are illustrated in the *Register scan alignment* form (see image below).

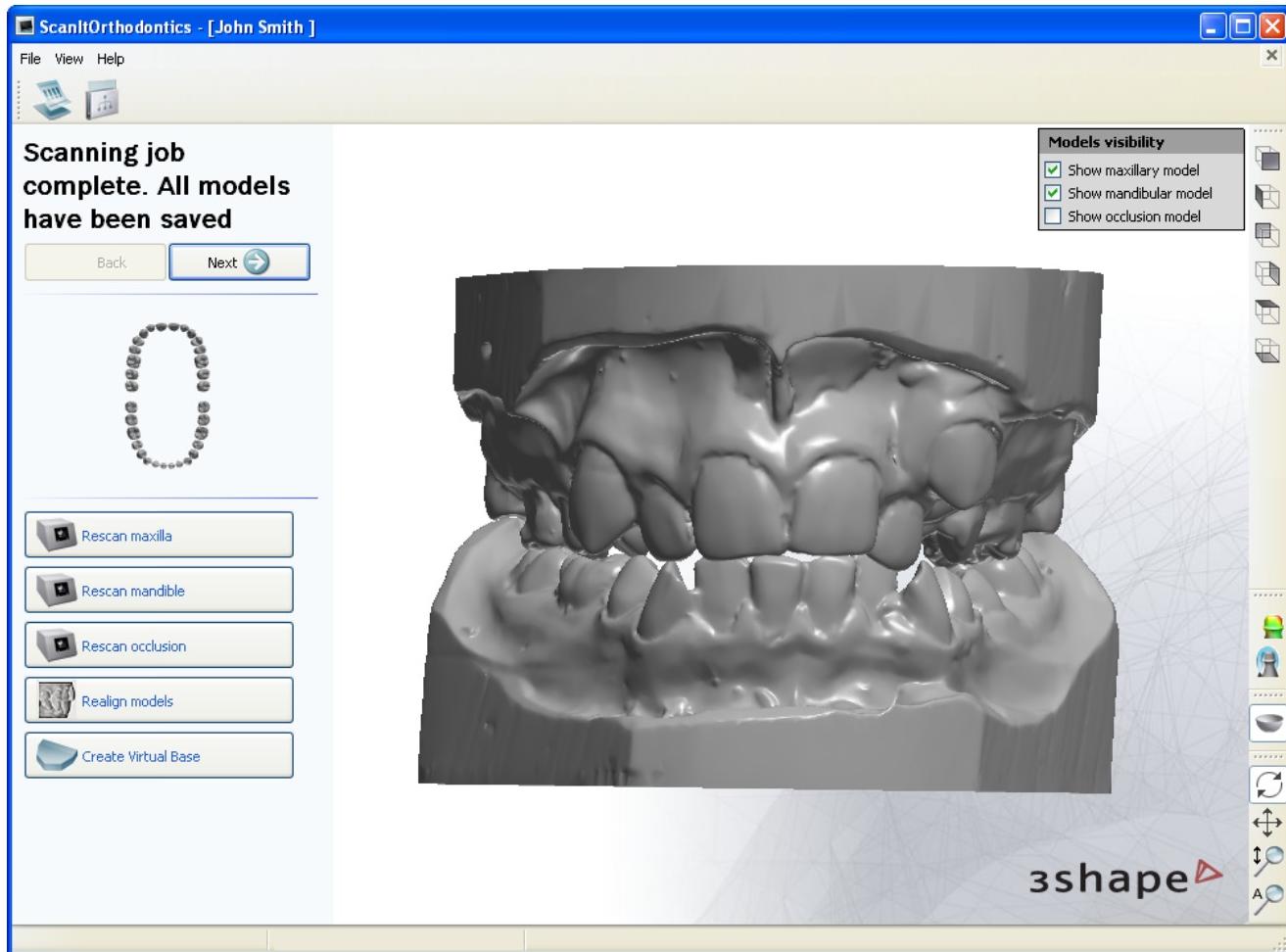


3.4 Creating Virtual Base

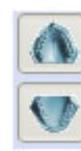
After a successful alignment, all models are saved and you can exit the program.

In case you want to rescan or realign your models, you can use the corresponding buttons in the Function panel.

The last button  allows you to create the virtual base for your model.



Click on it and the software will automatically open the *Virtual base* dialog window which guides you through its main steps: Default Cut or Define Cut, Fit Base and Create Base.



Upper/Lower base icons toggle the visualization of the corresponding models for better overview.



Previous / Next operations navigation buttons.



Default cut – makes the default cut.



Define cut – used to draw the cut or edit the created default cut.



Fit base – adjusts base.



Create base – creates a new base.

Select the desired **Base model** type from the drop-down menus. (The virtual models are set up under the **Template base models** in Ortho Control Panel).

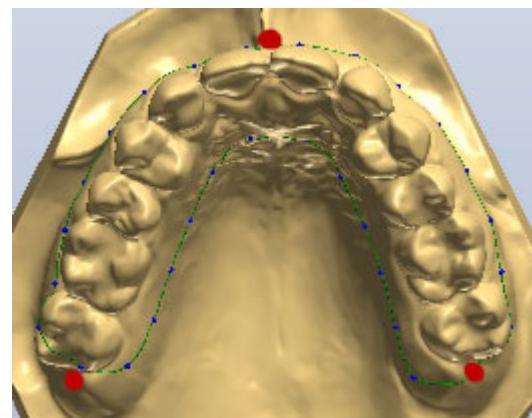
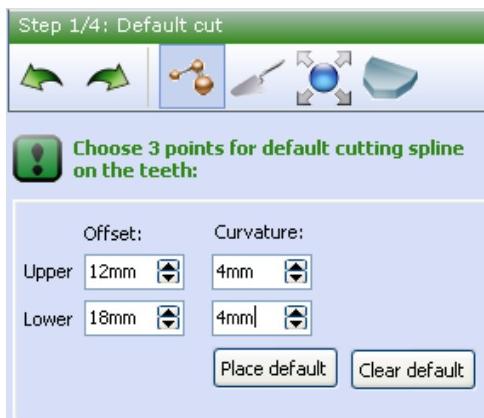
Default cut

You have the option of quickly positioning the default base cut or defining it yourself at the **Define cut** step. To place the default cut, click the **Place default** button and then adjust the positions of the cutting splines with the **Offset** and **Curvature** values shown on the image below (left).

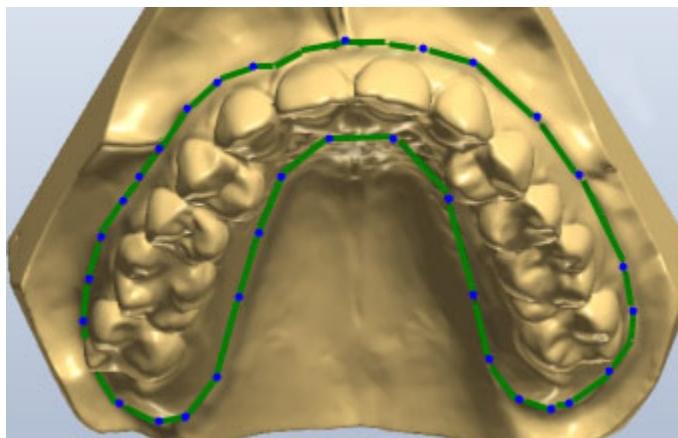
For a more accurate placement of the cutting splines select 3 points on each jaw as shown on the image (right) and then click the **Place default** button.

Incorrect splines can be removed with the **Clear default** button.

You can then go to the **Fit base** step or opt to adjust the cutting splines manually first at the **Define cut** step.



Define cut

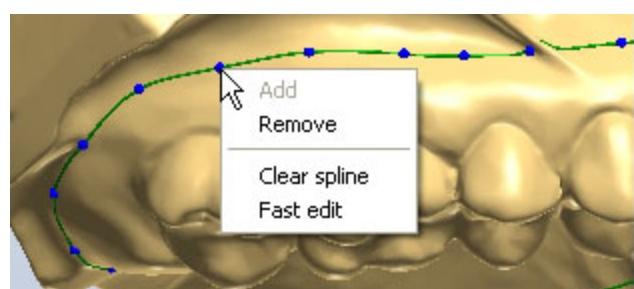


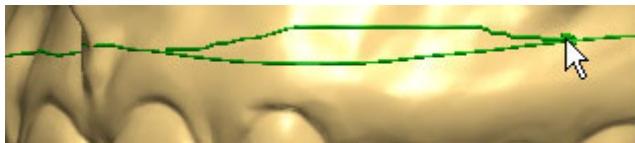
Decide on the part of the model you wish to leave, click the **Define cut** button if not already at this step and place the spline points over the model curve to define the cut. Click the first point of the spline to close it.

Where needed, adjust the spline manually by dragging the points with the cursor to the required position.

Incorrect splines can be removed by clicking the corresponding **Clear splines** buttons in the **Virtual base** dialog.

From the right-click menu options of the cursor positioned over the cutting spline you can **Add** new or **Remove** indicated spline points, **Clear spline** or use **Fast edit** function to correct the spline



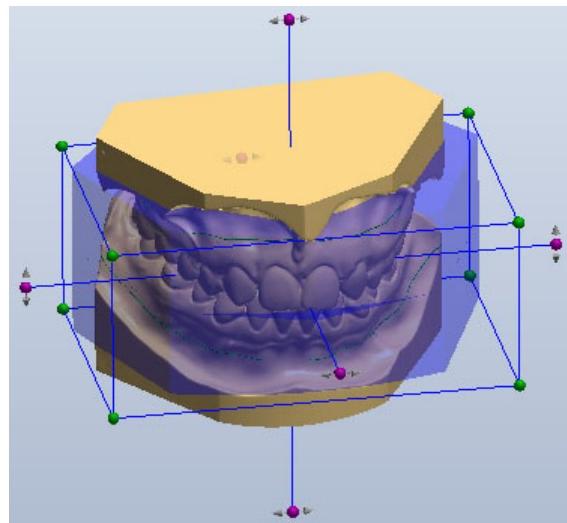


For **Fast edit**, left-click on the spline and move the cursor while holding the mouse button down to draw a new part of the spline.

Fit base

Once maxilla and mandible splines have been placed, click the **Next** or the **Fit base** buttons to go to the **Fit base** step.

You can adjust orientation of the base by dragging the violet points and the base size with the green points of the bounding box. Click and hold the mouse button to drag the bounding box to the required position.



The following parameters of the base can be modified:

<input checked="" type="checkbox"/> Show Virtual Base	Curvature	100
<input checked="" type="checkbox"/> Scale symmetrically	:	50 %
<input checked="" type="checkbox"/> Decimate base to	Dist. between bases	39.0 mm.
	Offset	2 mm.

Show Virtual Base – toggles visualization of the virtual base.

Scale Symmetrically – sets whether the bounding box is scaled symmetrically when dragging by the green points.

Decimate base to – specifies the decimation amount of the base triangles (see image below).

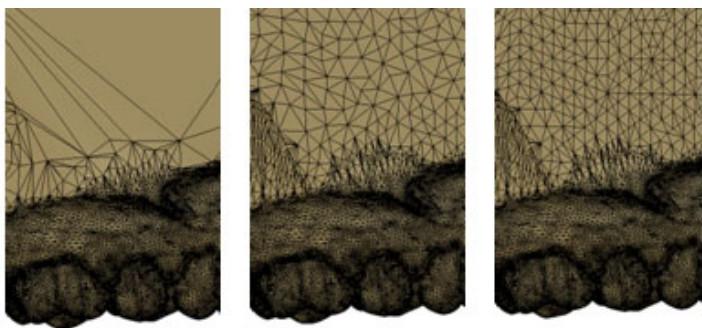
Curvature - sets the amount of curvedness for the base model along the sides (see image below).

Dist. between bases - Specifies the distance between the maxillary and the mandibular bases.

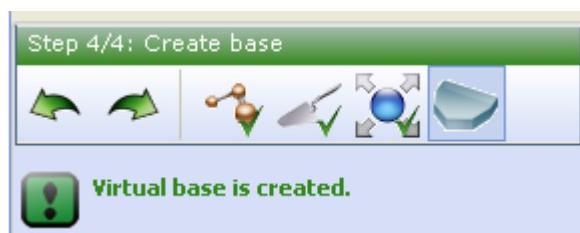
Offset - specifies the distance between the initial shapes of the base and the baseless model.

Decimation by 5%, 50% and 80% respectively.

Curvature sets the amount of curvedness for the base model along the sides.

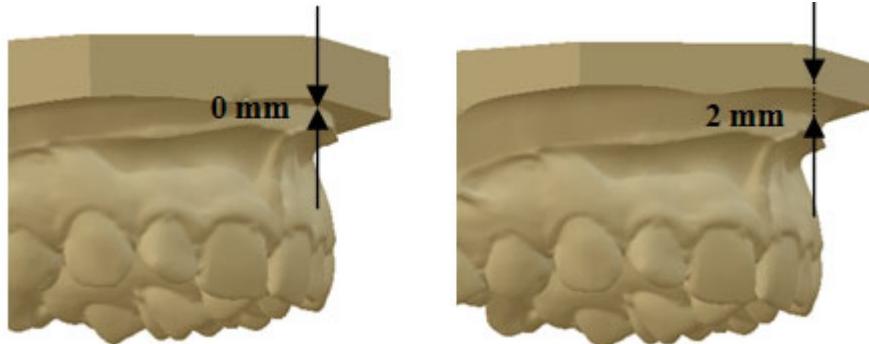


Create base



Once adjustments to the bounding box at the **Fit base** step are complete, click the **Next** or **Create base** button to create the virtual base.

Click **OK** to close the *Virtual base* dialog window. Your models now appear to have virtual bases.



Base offset 0mm and 2mm respectively

4 Processing on a Second PC

Scanning a model consists of two independent parts:

1. The actual scanning, during which raw scan data is captured.
2. Post-processing, during which the raw scan data is transformed into a surface.

ScanItOrthodontics allows these parts to be split onto two separate PCs, in order to save time. Such a configuration can be set up in the [Scan settings](#) form.

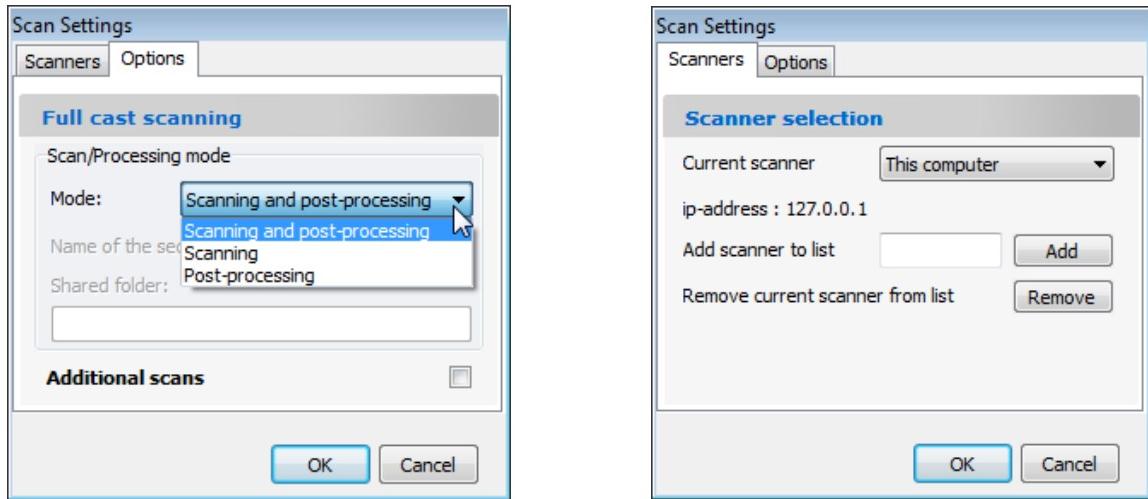
4.1 Scan Settings Form

The *Scan Settings* form is accessed through the *File* menu in the top left corner:

The form contains two tabs: **Scanners** and **Options**.

The **Scanners** tab should essentially never be changed, except in rare cases. Fill in your scanner's name/location in the **Add scanner to list** field (click **Add** to save) or select the required scanner from the **Current scanner** drop-down menu. Click **Remove** to remove the current scanner from the list.

The content of the **Options** tab is described below:



Mode – This is where you can set up processing on a second PC. The following modes are available.

- **Scanning and post-processing**: The current PC will perform both the scanning and processing (this is the default configuration).
- **Scanning**: The current PC will perform only the scanning part. In this mode, you must also specify the following:
 - Name of the second PC
 - Shared folder

Name of the second PC – This is the computer name of the second PC. It can be found on the second PC under the **System Properties** (*Start* -> *Control Panel* -> *System* -> *Computer Name* -> *Full computer name*).

Note! All references to network or company name should be omitted (for example, if the computer name in the System Properties is "PC101.3Shape.local", then you should only enter "PC101" here).

Shared folder – Here you specify a shared folder on your local network, or on the second PC, which will be used to exchange files between the two PCs.

Note! If this folder is on the second PC, as opposed to the network, then it must be specified in the form "\\\Second PC's name\...", and not "C:\....". The shared folder must have write privileges (i.e. it must not be "Read only").

- **Post-processing**: The current PC will perform only the post-processing part.

Additional scans – This option enables scanning from additional pre-defined views. It can be useful for models which, due to their geometry, are particularly challenging to scan. The disadvantage is an increase of a little over one minute in the total work time for each single model.

4.2 Workflow

When splitting the scanning and post-processing steps on separate PCs, it is very important to do things in the correct order; otherwise your work will not be saved! The correct order of operations is as follows:

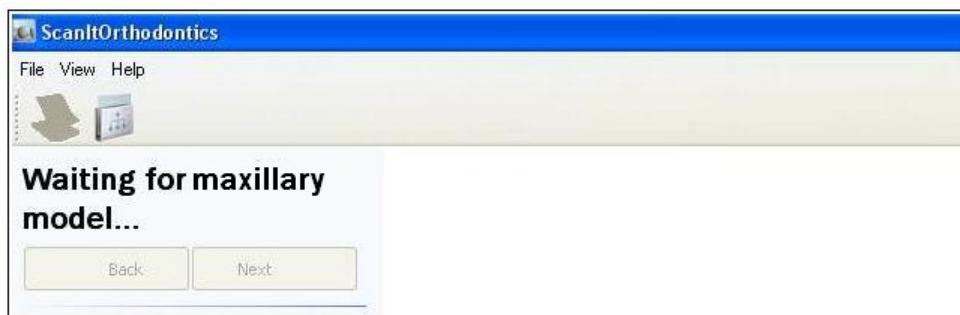
1. Start ScanItOrthodontics on the processing PC (see the [Post-Processing Mode](#) chapter).
2. Start ScanItOrthodontics on the scanning PC and fill out the patient and model set information forms. Start scanning, as usual (see the [Performing a Scanning Job](#) chapter).
3. The alignment is performed on the processing PC.

Performing and evaluating the alignment are the only things you should do on the processing PC. Everything else must be done from the scanning PC: creating new orders, re-scanning, etc.

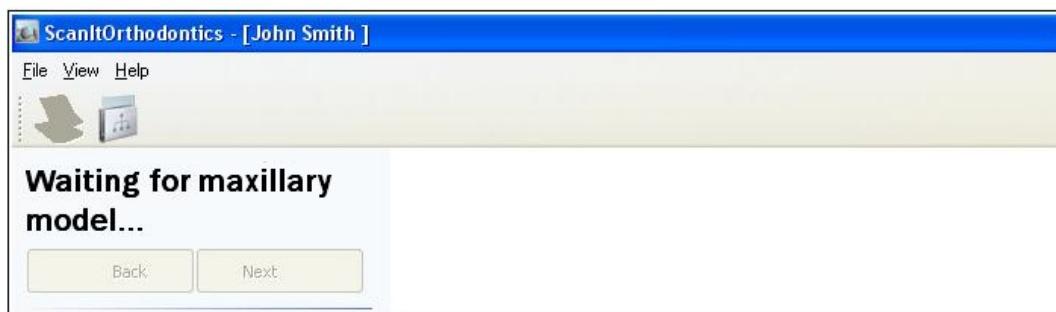
Note! All files are saved on the processing PC, in the location specified in the Control Panel. Nothing is saved on the scanning PC.

4.3 Post-Processing Mode

When ScanItOrthodontics is started in the **Post-processing** mode, there will be no patient information to fill out. Instead, you will immediately see the following:



At this point, the program is waiting for the scanning PC to send information. You should now start ScanItOrthodontics on the scanning PC and enter all patient and model set information. As soon as this is done, the patient ID will be displayed in the program's title bar on both PCs. Therefore on the processing PC, you will see the following:



If your version of ScanItOrthodontics is currently in a different mode, and you would like to switch to the **Post-processing** mode, please do the following:

1. Run ScanItOrthodontics. You will immediately see the patient info form (since you are not yet in the **Post-processing** mode). Click **Cancel** on this form, thus closing it.
2. Go to the **File** menu and choose **Scan settings**. In the **Options** tab, change the mode to **Post-processing**.

3. Click the **Create new order** button in the top left corner. Your PC is now ready to receive data from the scanning PC.

4.4 Scanning Mode

In the **Scanning** mode, ScanItOrthodontics works almost exactly as in the **Scan and post-processing** mode described in the [Performing a Scanning Job](#) chapter. Essentially, the only difference is that it will not perform the alignment – this is done on the processing PC. Note also that all surface models (i.e. STL or DCM) will appear only on the processing PC.

Note! The scanning PC does not know anything about what the processing PC is doing or has done. Therefore, do not create a new order from the scanning PC if there is a pending order on the processing PC, on which you have not yet performed alignment. Only once the alignment is complete should you define a new order on the scanning PC (this does not apply if the pending order does not require alignment).

5 Loading the Existing Orders

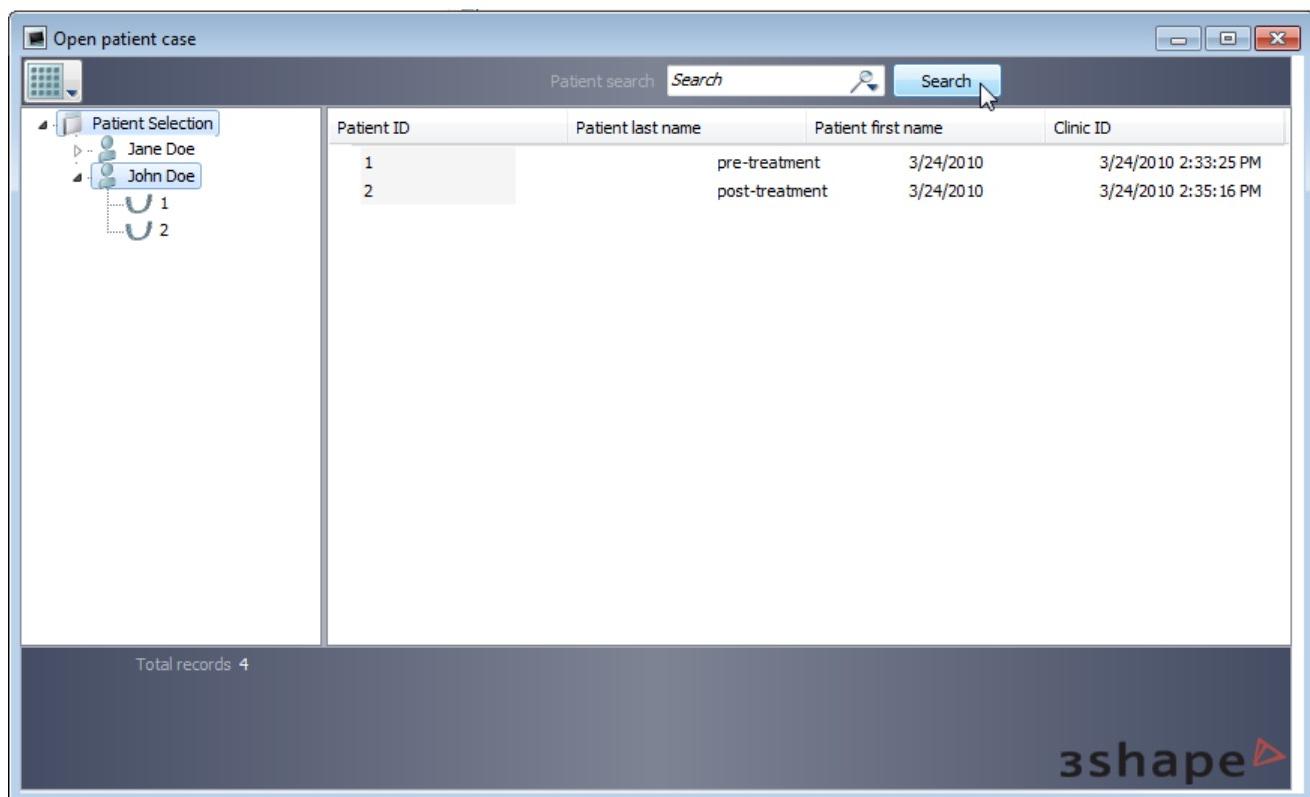
ScanItOrthodontics allows you to load orders you have previously scanned. This can be useful if, after you have completed a scanning job, you find some problem that you had not noticed while performing the scanning job. For example, you might think the alignment is a bit off and would like to redo it; or you might feel that the file sizes of the models are too large, and would like to produce lighter (more "decimated") models.



To load an existing order, click the **Load order** button (image to the left). Alternatively, you can use the Browse button on the *New patient info* form (see the [Patient Information Form](#) chapter for details).

You will now see the *Open Patient Case* form (see image below).

1. Click the **Search** button in the top right corner to see all cases which are currently in your Data folder (recall that this folder is defined in the Control Panel).
2. Click the little black triangle ▾ next to a patient: this will display all model set IDs (i.e. scanning jobs) for this patient.
3. Double-click the scanning job you want to load.



When the order is loaded, you will see the patient ID in the program's title bar. You will not see any models. At this point you have two choices:

1. **Load all surface models** (i.e. STL or DCM files) **to redo the alignment**. Go to the *File* menu and select **Load all surface models**. This will make the models appear on the screen. You can now click the **Realign models** button and redo the alignment.

Note! It is only possible to load surface models if all three models exist: maxillary, mandibular, and occlusion. This is because this functionality is only intended for performing re-alignment.

2. **Re-process the raw scan data.** As mentioned previously, the idea here is to allow you to obtain new surface models without re-scanning. To do this, click **Next** as if you were starting a scan. You will now see the following message:



If you choose **Yes**, the scan will be skipped and post-processing will begin immediately. If you choose **No**, a new scan will be started. When post-processing of a model is complete, click **Next** as you would normally do when scanning.

Note! This functionality is only possible if **Save raw scan data** checkbox was selected in the Control Panel at the time of the original scan.

Hint! The existing surface models will be automatically replaced by the newly processed models. So if you want to retain the originals, you will need to manually back up these files before proceeding.

OrthoAnalyzer is an advanced 3D analysis and measuring software package for orthodontists to facilitate fast and easy 3D analysis as well as advanced treatment planning from digital study models.

OrthoAnalyzer

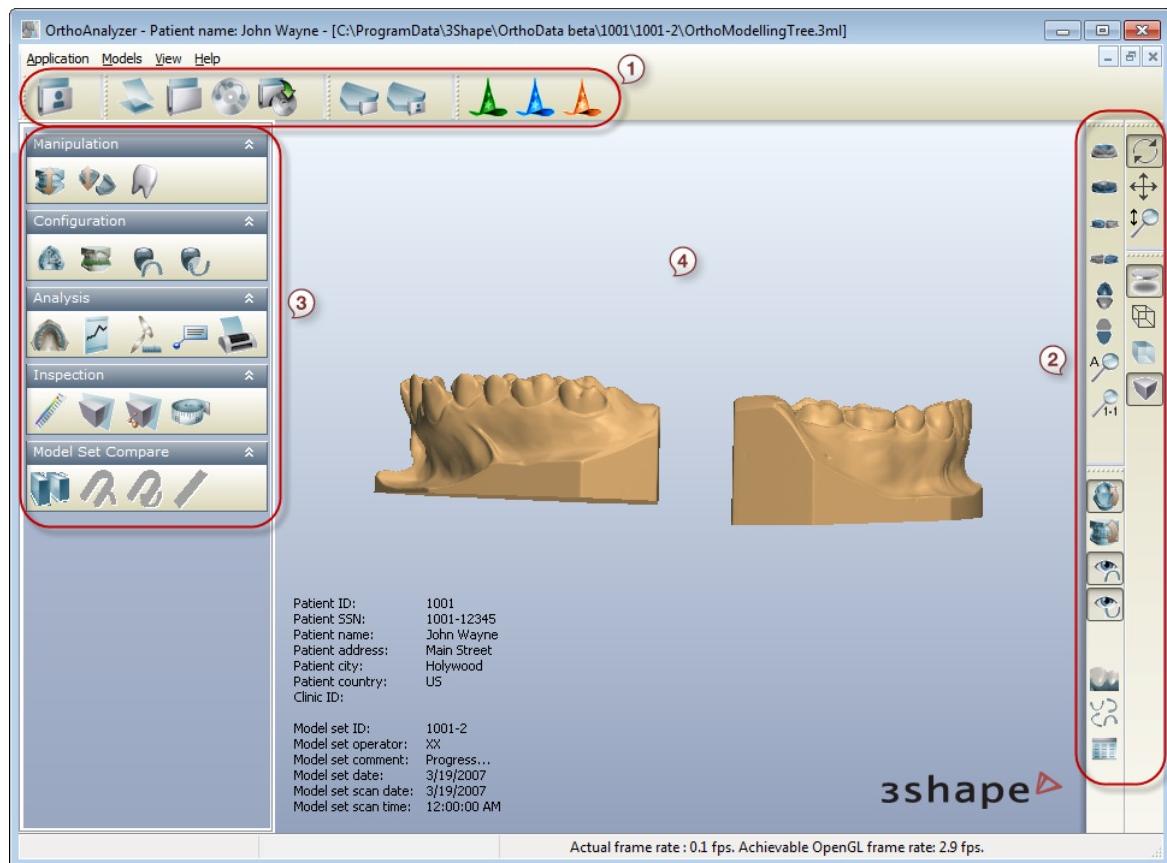
This manual introduces the OrthoAnalyzer software's functions.

From herein, it is assumed that the OrthoAnalyzer user is familiar with basic orthodontics terms and concepts.

6 OrthoAnalyzer User Interface

The user interface comprises of the following four sections as indicated on the image below:

1. Main toolbar
2. Visualization toolbar
3. Functional panel
4. Session window



A detailed description of these is provided in the following sections.

6.1 Main Toolbar

The Main toolbar contains functionality relevant to managing the analysis and the modelling processes:

Item	Action
	Patient model set – Loads previously created patient model sets from the patient database.
	New session – Starts a new analysis session on a model set which is not attached to any patient.

	Open models – Opens model(s) required for inspection and imports them into the system.
	Save session – Saves the current analysis session to default file.
	Export models as.. – Saves the current analysis session to the selected file.
	Create virtual base – Starts the utility designed for the virtual base modelling on the model set not attached to the patient database.
	Open patient model set in virtual base – Starts the utility designed for the virtual base modelling inside the patient database.
	Preparation – Is a customized workflow wizard that contains the following default steps: Occlusion, Alignment for open model set, Setup local origo on maxillary model, Setup occlusion plane, Preparation maxillary model, Preparation mandibular model.
	VirtualSetup – Is a customized workflow wizard that contains the following default step: Dental arc analysis and Move Teeth.
	Analyzer – Is a customized workflow wizard that contains the following default steps: Analysis objects, Overbite/Overjet, Dental arc analysis, Analysis reports and Generate Report.



NOTE: The customized workflow wizard let you create or edit your own workflows in order to adapt OrthoAnalyzer to your particular needs. The wizards are customized under the *Workflow Settings* of the Ortho System Control Panel.

6.2 Using the Mouse and Keyboard

The use of the mouse and keyboard for common functions in OrthoAnalyzer is identical to the Windows applications.

The use of the right mouse button is mostly restricted to 3D-specific operations. The default setting in OrthoAnalyzer allows you to use the right mouse button to rotate and zoom the models in 3D view or to pan in 2D view. The configuration can be changed by clicking the **Rotate view**, **Pan view** or **Zoom view** buttons in the Visualization toolbar or by using the keyboard shortcuts shown in the table below.

Visualization toolbar button	Corresponding key	Action
Pan view	ALT	Press the right mouse button and drag mouse to pan the view.
Rotate view	CTRL	Press the right mouse button and drag mouse to rotate the view.
Zoom view	SHIFT	Press the right mouse button and drag mouse to zoom in and out.

Shortcuts for changing views using mouse and Visualisation toolbar or keyboard

The preferred working practice is to have the **Rotate** view button of the Visualization toolbar pressed while using the mouse wheel to perform panning and zooming of the view as described in the table below. Some functions of the Visualization toolbar are purely mouse functions.

Mouse wheel	Action
Pressed	Move the mouse in the 3D view to pan .
Scrolled	Scroll mouse wheel in the 3D view to zoom in and out .

Shortcuts to changing views using mouse

6.3 Visualization Toolbar

Finding the right point of view to work on a 3D model most effectively can be difficult and time-consuming. OrthoAnalyzer comes with a set of tools aimed at helping you find the most advantageous visualization. The visualization tools are grouped in the Visualization toolbar and allow to:

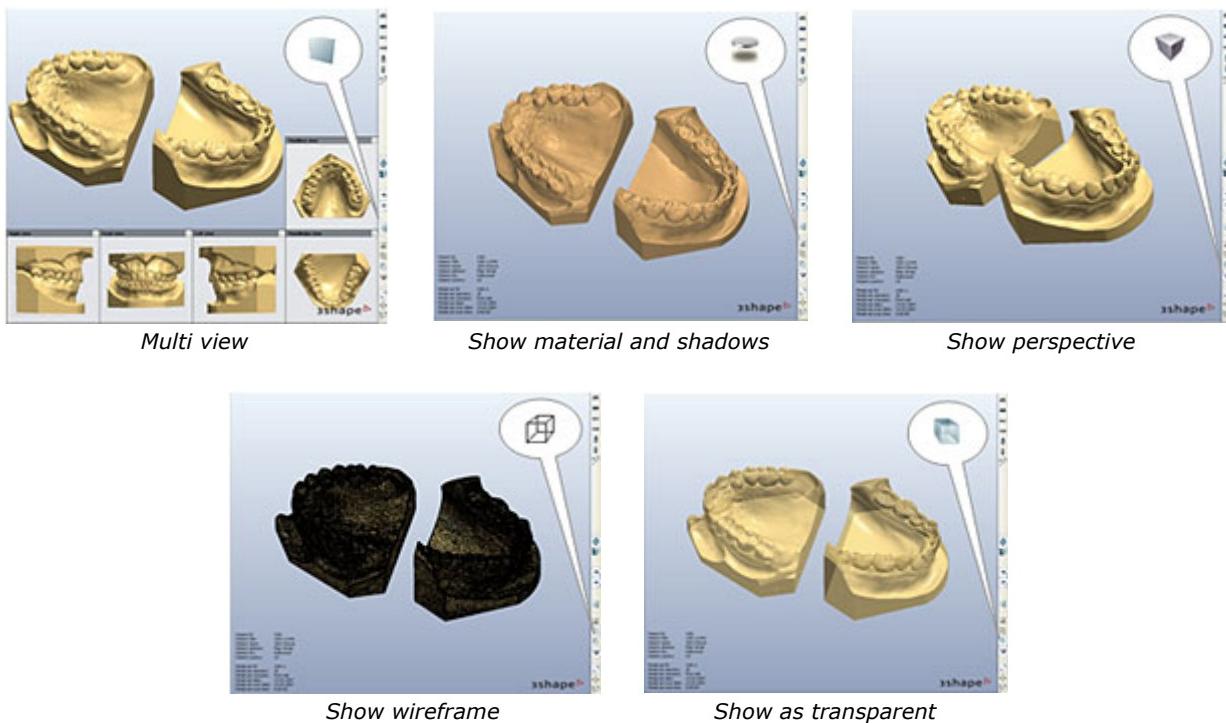
- **Rotate the 3D view** to a preset angle: this allows you to view the models from the front, back, top, bottom etc.
- **Set the position of objects** on the screen for analytical inspection of the models in relation to each other.
- **Set the visibility of objects** visualizing a part of the virtual cast, which allows for a more detailed inspection of particular objects on the virtual cast.
- **Set the objects transparency** for the current operation to see or hide their internal structure.
- **Switch to custom rotation and panning mode** enabling rotation and free movement of objects on the screen.

The buttons in the Visualization toolbar are presented in table below:

Item	Action
	<p>View – The view buttons allow you to switch between a number of predefined viewpoints:</p> <ul style="list-style-type: none">• Front view• Rear view• Right side view• Left side view• Top view• Bottom view <p>NOTE: The appearance of the View toolbar depends on whether the virtual cast is open (see the left images column) or closed (see the right images column) appearance of the View toolbar changes.</p>
	Zoom all – Sets the model to the default view, size and position on the screen leaving its current rotation angle intact.
	Real scale view – Displays the model on a screen in the real size. A special scale that appears on a screen helps to manually set the model in the real size by comparing an actual ruler with the scale on a screen.
	 <p>Axis locked rotation – Locks the rotation to the x, y or z axes.</p>
	Mouth view – allows you to switch between the two types of cast visualization: <ul style="list-style-type: none">• Open mouth view – Enables detailed analysis of individual items on the virtual casts with minimal relation to each other.• Closed mouth view – Enables relational occlusion analysis for the maxillary and the mandibular arches.

	Show maxilla and Show mandible – Selects either the upper or the lower cast for visualization.
	Teeth segmentation mode – Displays the Tooth panel to view and manipulate the teeth and jaw as separate objects.
	Multi view – Displays five views of the same virtual cast in separate windows: Right side view, Front view, Left side view, Mandibular view and Maxillary view.
	Show analysis values – Displays the Analysis objects form with values of the performed analysis.
	Show material and shadows – Marks the cast segments with the corresponding material colors and toggles on and off the function of shadow visualization.
	Show wireframe – Shows the triangulation of the virtual casts.
	Show as transparent – Changes the degree of transparency of the virtual casts.
	Show perspective – Transforms the model into a realistic 3D object, where the distant objects appear smaller than the closer ones.
	Rotate view – When selected, right-click and drag to rotate the view.
	Pan view – When selected, right-click and drag to pan the view.
	Zoom view – When selected, right-click and drag to zoom in and out.

Applied views of some of the functions of the Visualization toolbar are shown on the image:



6.4 Function Panel

Each stage in the analysis and planning process is represented by a tab in the Function panel.

As different jobs require different functions, the Function panel changes its look depending on a job. You are free to choose the first step in the Function panel to complete. Therefore, there is typically no a predetermined workflow of tasks however, the tasks can be organized in predefined workflows by using the workflow wizard (see section [Customized Workflow Wizard](#)). An example of a workflow is the **Analysis** tab which deduces the analytical meaning out of the measurements set up in the **Configuration** section.

A brief overview of functions available in the Function panel is presented in the table below.

	HINT: Please refer to chapters 3-7 for more information about each of the tools included in the function panel.
---	--

Item	Action
	The first part of the toolbar is the Manipulation tab. It includes the following steps:
	Helps re-align the upper and lower virtual casts.
	Helps align the upper and lower virtual casts for the open model to make the visualization and manipulation of the model more convenient.
	Treatment simulation via virtual setups.
	The second Configuration tab assists with indicating landmarks on the virtual model set and contains the following steps:
	Specifies the point on the model which will subsequently serve as local orientation point from where the coordinate system axes originate.
	Sets up the occlusion pane for the model set.
	Definition and segmentation of individual teeth for the maxillary side.
	Definition and segmentation of individual teeth for the mandibular side.
	The functions in the Analysis tab are assorted according to the operations executed in the previous steps, they typically rely on the selections and definitions made in the preceding sections. The tab contains the following steps:
	Provides calculations for arch lengths based on the selections made in the Configuration section of the Function panel and enables the creation of an ideal arc shape to be used for the treatment.
	Provides detailed analyses of the various orthodontic data for both maxillary and mandibular casts comparing them with the standardized values tables pre-set in Ortho Control Panel. This involves inspecting the tooth widths, space, the anterior and Bolton ratios.
	Provides the overbite/overjet measurements for easy diagnostic.
	Sets up additional custom landmarks, planes, angles etc. on the model set. These objects allow you to fully create your customized analyses routines.
	Creates an analysis report based on the analysis data ready to print.

	The Inspection tab offers tools for analytical tasks that can be done directly on models without selections in the Configuration part. The tab contains the following steps:
	Visualizes the occlusal distances in the model set according to the color scale applied to the virtual casts.
	Enables you to select an appropriate area for a detailed 2D cross-section inspection and on-grid measurements on the customisable cut-plane.
	Enables you to select the appropriate area for a detailed 2D cross-section inspection and on-grid measurements along dental arc.
	Measures the distance between two points selected on the models in three different 3D modes (direct, surface, and caliper).
	The final functional tab Model Set Compare assists in effective comparison of two model sets attached to one patient. The tab contains the following steps:
	Enables immediate comparison of model sets visualizing the two simultaneously.
	Aligns upper models belonging to different model sets of the same patient for comparison.
	Aligns lower models belonging to different model sets of the same patient for comparison.
	Compares shape differences of the reference and the compared model sets with the help of a detailed color scale.

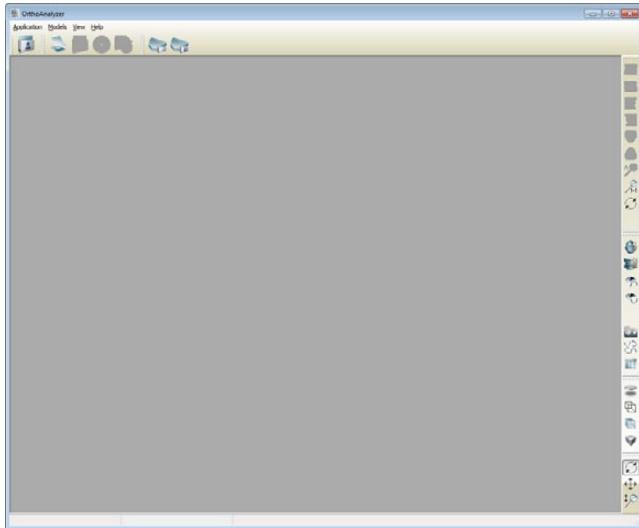
7 Getting Started

This chapter describes the principles of managing the orthodontic models in OrthoAnalyzer™.

The chapter is divided into three parts: the first part is about a new patient entry, the second is for working on already created cases, and the third is for running an independent session with no patient database attachments.

7.1 Executing OrthoAnalyzer™

OrthoAnalyzer™ is started by double-clicking the OrthoAnalyzer™ desktop icon  or via the Windows™ Start menu: *Start → Programs → 3Shape → OrthoAnalyzer*. When the application starts, the screen as displayed on the image appears.

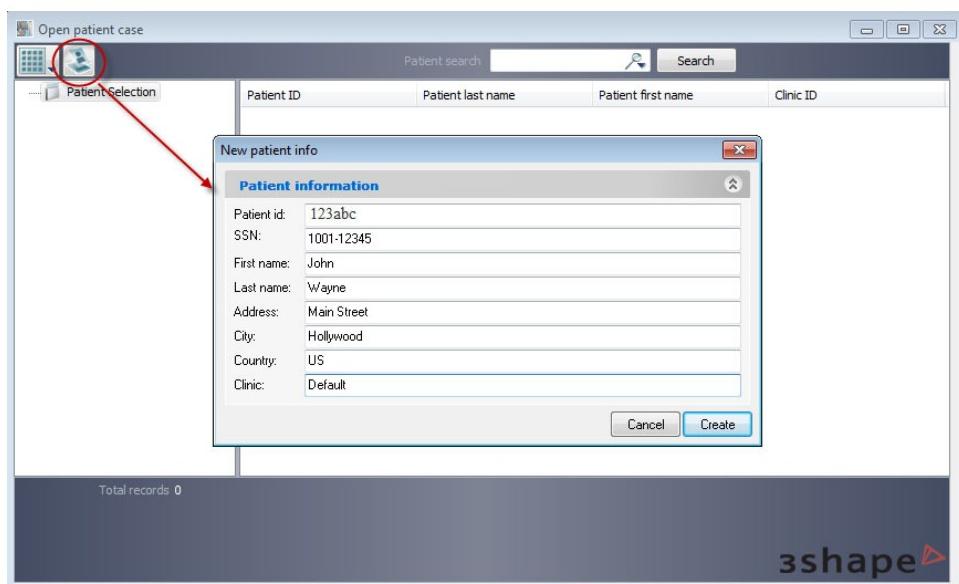


7.2 Creating a New Database Entry

7.2.1 New Patient

Before starting an analysis session, a patient database needs to be created. To create a new patient, click on the

 **Patient model set** button in the Main toolbar and select  **New patient**. A *New patient info* form will pop up.



The fields in the form contain administrative and personal data of the patient for whom the order is created.

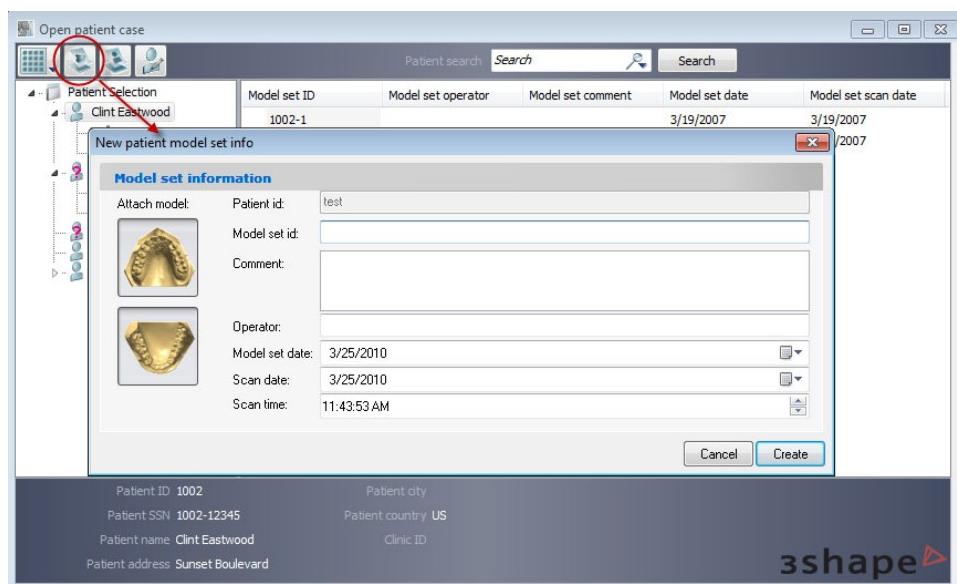
A few of the fields are explained below:

- **Patient ID** – This field is reserved for the patient's unique ID. It is a manually maintained string of alphanumeric symbols.
- **SSN** – Stands for the patient's Social Security Number.
- **Clinic** – A description string for the clinic the session is being held for and is made for the scanning centers. To use this option the clinic and its data have to be previously registered in Orthodontics Control Panel.

Click **Create** to save the data entered.

7.2.2 New Model Set

This step creates a new model set for the current patient by letting you to fill in a small dialog box. Click the  **New model set** button to get the *New patient model set info* window:



The section **Attach model** lets you select the new model set intended for import. Click **Create** to save the entered data. The description of the form is provided below:

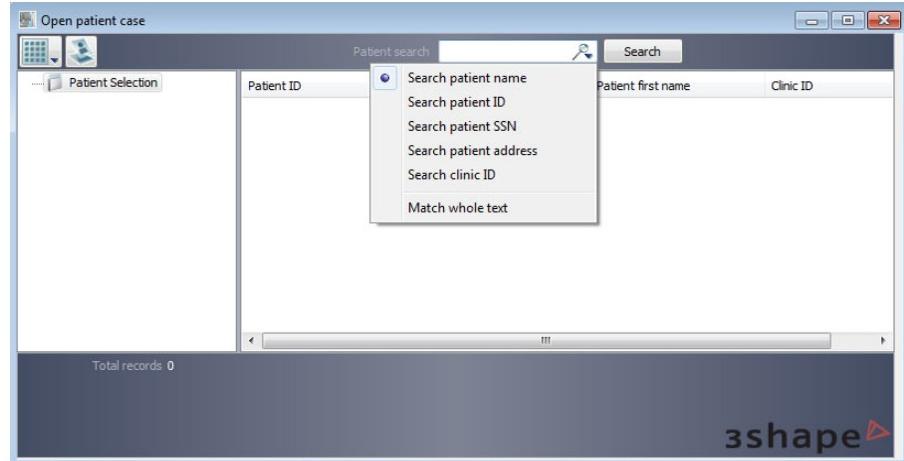
- **Model set ID** – Corresponds to the ID string that uniquely identifies the model set for a particular patient.
- **Comment** – Any comments related to the order or the model can be added here.
- **Operator** – Fill in the name or the code of the operator performing model set analysis.
- **Model set date** – The date the model was created (the default date can be modified).
- **Scan date and Scan time** – The Date and time the scan was taken (the default date and time can be modified).

 **NOTE:** The information specified in **New patient** and **New patient model set** appears at the bottom left corner of the session window for reference.

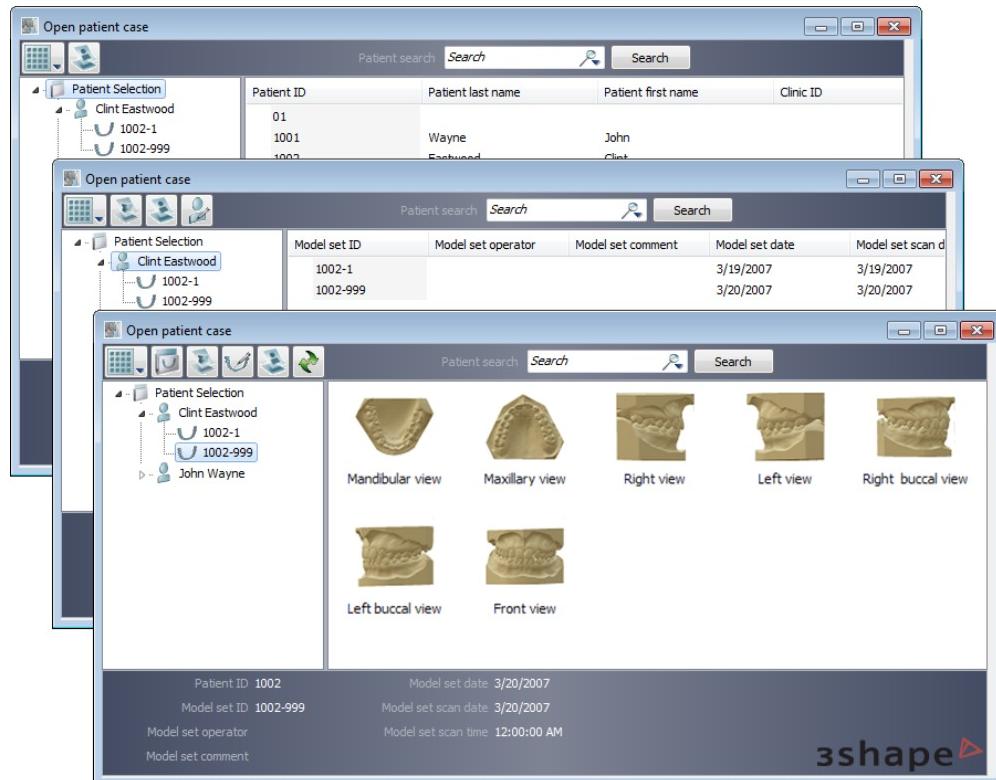
7.3 Returning to the Database Entry

7.3.1 Patient Model Set

Another option to start analysis session is to open an existing patient model set by clicking the  **Patient model set** button in the Main toolbar. Then the empty *Open patient case* window pops up suggesting to search for a patient.



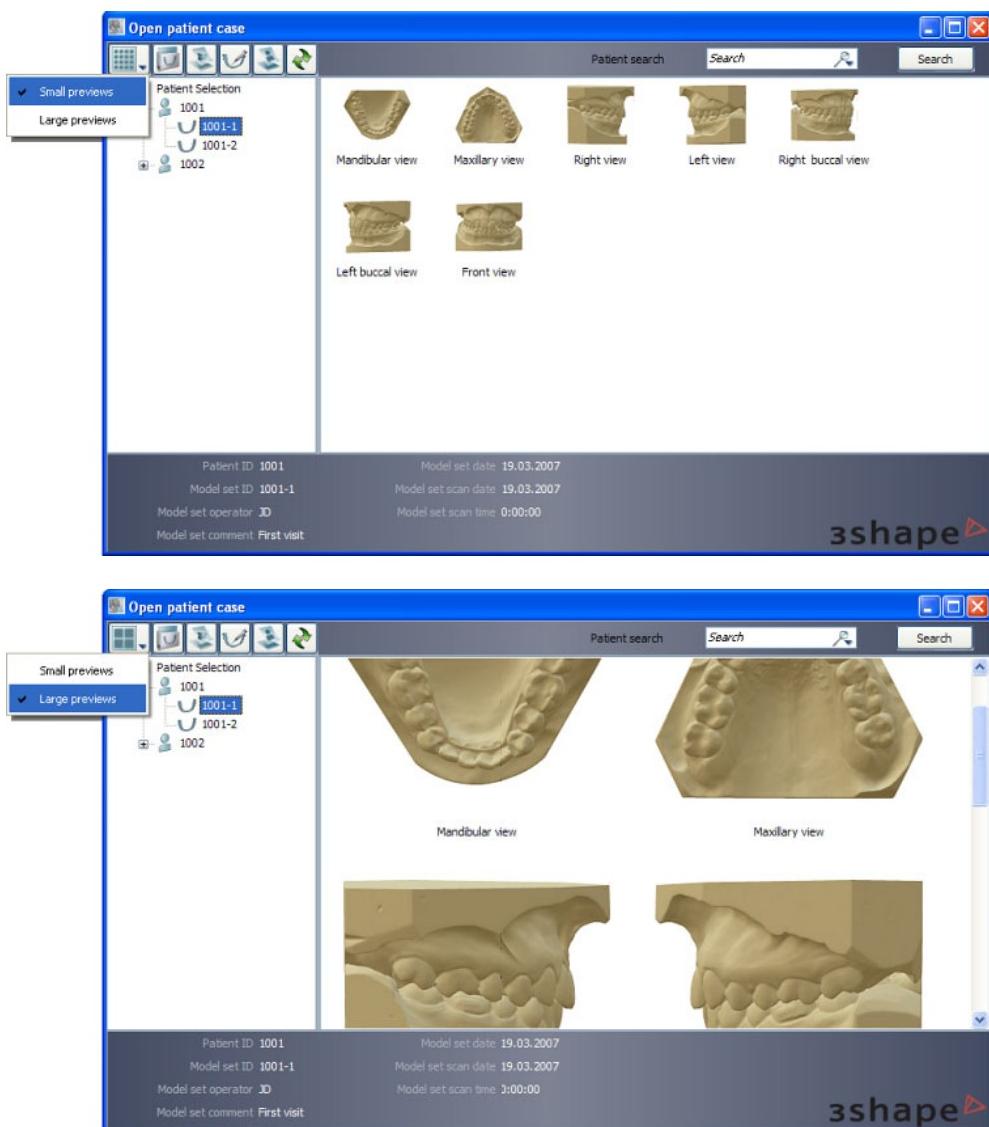
- To view model sets for inspection, search for them using the search bar in the right corner of the window, which includes various criteria to search with for the necessary patient model set(s) (e.g. patient's ID or address).
- To see all available model sets set in the Control Panel, click **Search** leaving the search bar blank. A list of patients sorted by their IDs will appear under **Patient Selection**, which would offer model set(s) for further inspection.



- The system employs several indications displayed in the main window to help you look for the necessary model sets in the catalogue:

- a)  Clicking on the root of the **Patient Selection** tree will display patients' IDs and names.
- b)  Clicking on one of the patient ID (name) in the catalogue will display the ID, operators, comments, model set dates and scan dates associated with all the model sets for the patient ID selected.
- c)  Unfolding the patient model set tree further and clicking on one of the model IDs (e.g. 1002-1), representing the selected model set, will display seven views corresponding to this particular model.

NOTE: There are two preview options available at this stage: small previews and large previews. Click on the **Views** button on the top toolbar to select the most convenient viewing option.



- Throughout advancing to the last node of the selection tree, the system assists you in tracing the order selection, as well as in managing the active selection with available options. There are two sections in the window which perform this task:
 1. The dark grey field at the bottom of the window summarizes the information related to the active selection.
 2. The top toolbar window modifies its content according to the active selection:

- a) While you are at the **Patient selection**, the only option available at this stage is:



New patient creates a new patient in the patient database (see chapter [New patient](#)).

b) Selecting a **patient model set** adds two additional buttons:



New model set allows you to create a new patient model set for the selected patient (see chapter [New model set](#)).



Edit patient... button opens the existing patient information form of the selected patient for editing. Click **Change** to save changes.

c) Selecting a **patient case** adds two new buttons designed to help with managing an individual model:



Open model set button produces just the same effect as a double left-click on the selected model, i.e. it submits the selected model to the analysis process opening it in the session window.

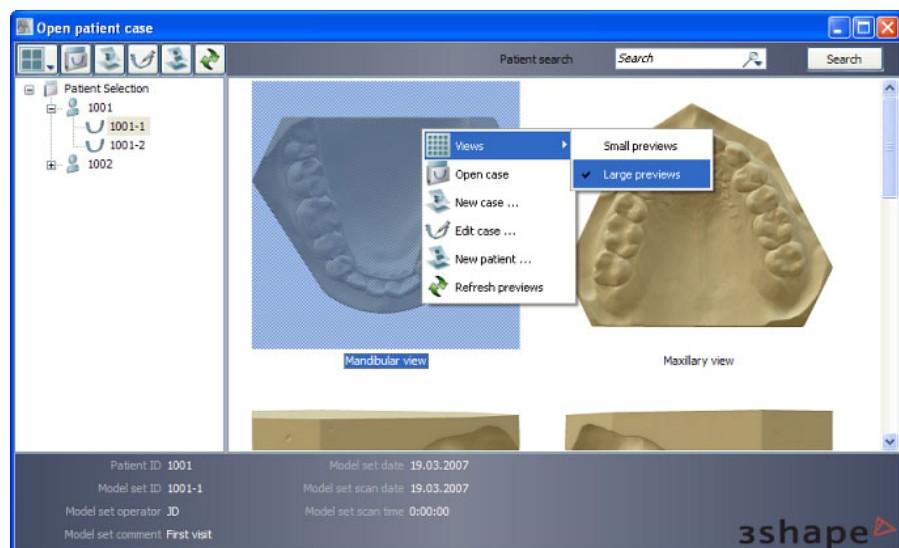
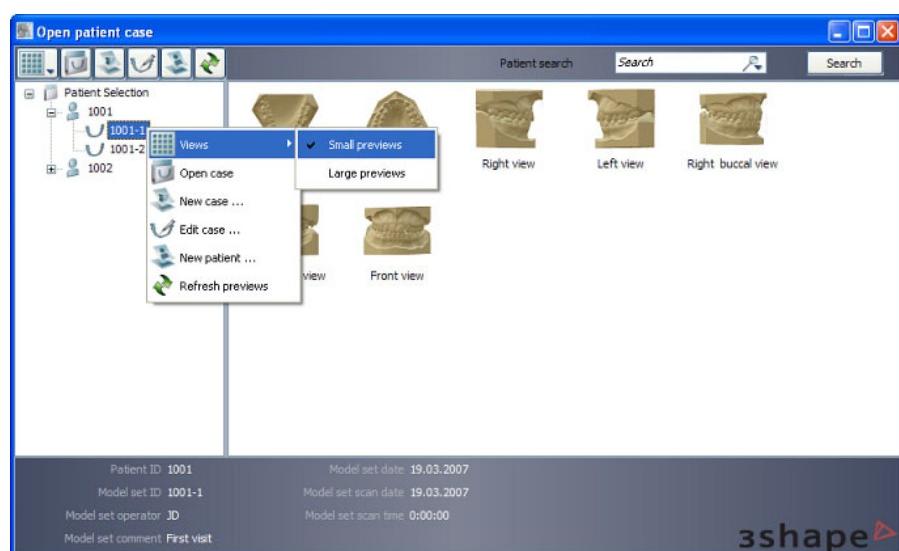


Edit model set... button opens the existing patient case information form and suggests editing the fields which were previously filled in. Click **Change** to save changes.



Refresh previews refreshes visualization of the settings changed in the Ortho Control Panel.

All of the options described above may also be accessed by right-clicking on the active selection label (top) or image (bottom):



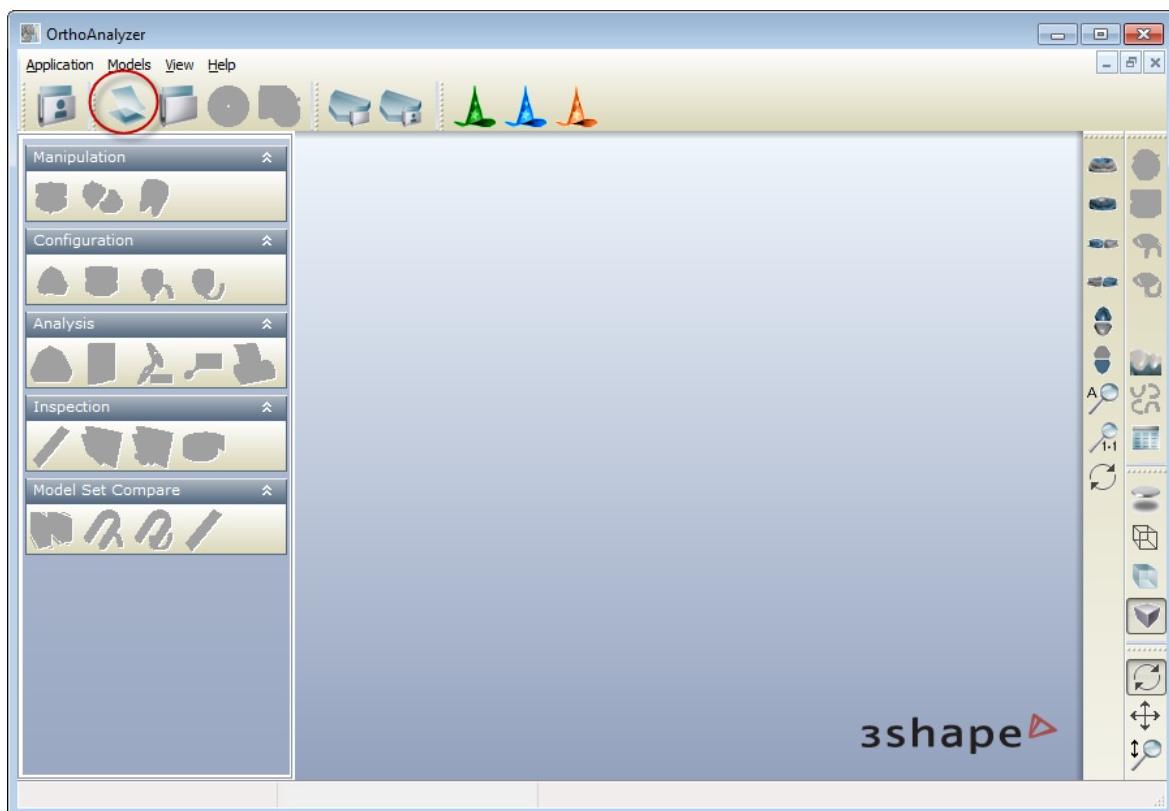
7.3.2 Open Model Set

In order to complete this step, it is required that there is a patient case created (see chapter [New Patient](#)). Having opened a patient model set in the session window (see chapter [Patient Model Set](#)) you may employ the  **Open model set** option to see the record of just the patient case specific to the model opened. The function is provided in order to open a different model set for the same patient and to compare models while making a complete analysis of a single model set.

7.4 Starting an Independent Session

7.4.1 New Session

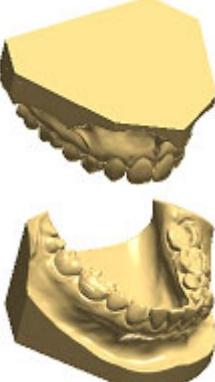
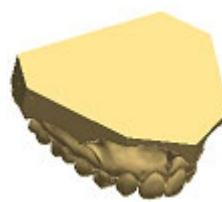
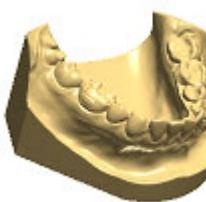
Model sets can be created using the  **New session** function. A new blank session window will appear with the main toolbar suggesting loading scans in .dcm or .stl format to start a new analysis session outside of the patient database system.

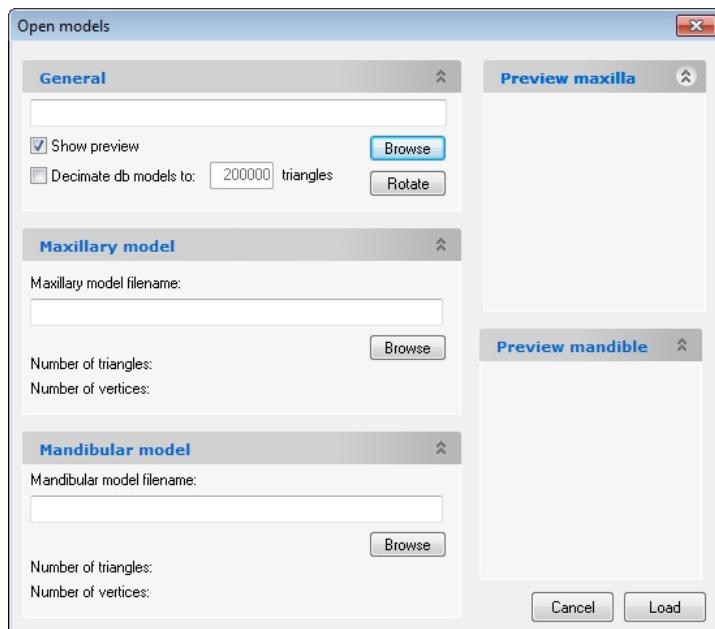


7.4.2 Open Models

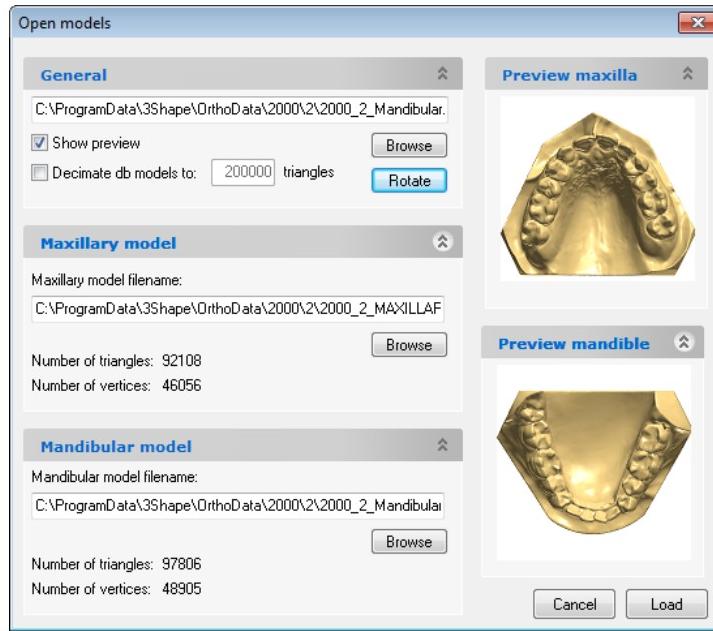
To start an analysis session it is first necessary to open existing models for inspection.

1. Click  **Open models** in the Main toolbar. The empty *Open models* window pops up suggesting browsing for a model in **.dcm**, **wrl** or **.stl** formats.

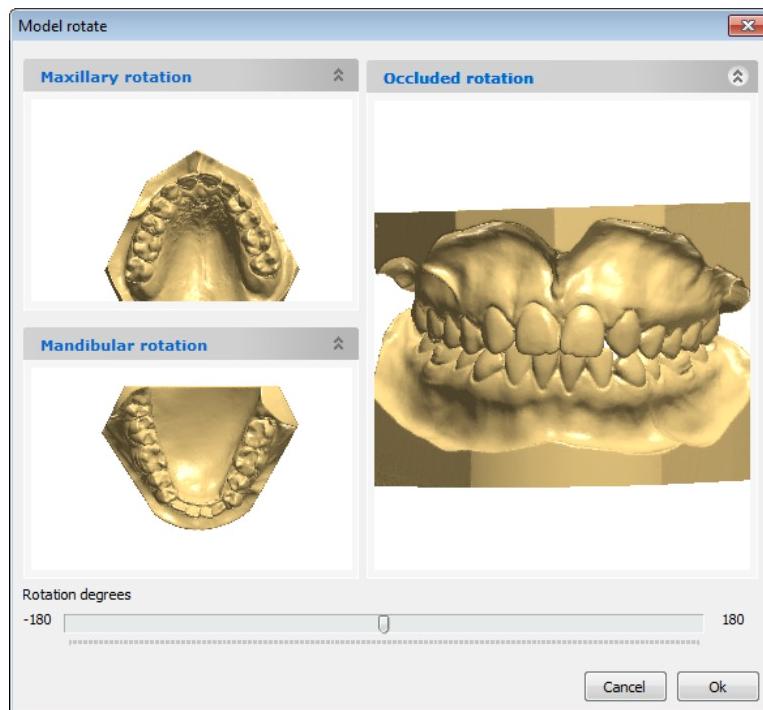
General: Select either of the 2 models to automatically locate the complementary model and open the model set.	Maxillary model: Choose a maxillary model only, to load into the system.	Mandibular model: Choose a mandibular model only, to load into the system.
		



2. To browse for a model set in the Orthodontics Control Panel, use the *Browse* buttons under each of the blank fields. The default path to the folder with files of the patient database is C:\Program Files\3Shape\OrthoData.
- You may browse exclusively for the maxillary or mandibular models using the **Maxillary model** or **Mandibular model** fields of the window.
 - If both parts of a model set are required, then it is possible to either select them using the option described above or to browse for any of the two models in the **General** field. The system automatically locates the pair model in the same folder to form a properly occluded double-cast for further inspection.



3. Check **Show preview** to see the selections made in the preview boxes to the right of the window.
4. Check **Decimate db models to...triangles** to decrease the number of triangles on the model to a predefined value.
5. Click **Rotate** to set the appropriate rotation angle for the relational positioning of the maxillary and the mandibular models. In the new window which pops up immediately after you push the **Rotate** button, move the **Rotation degrees** sliding bar (minimal value being -180°, maximal 180°) to bring the rotation angle to the necessary value. View the changes made in the preview boxes provided, to help you to control the maxillary, mandibular and the occluded modes rotation.



6. Click **Load** to display the selected model(s) in the session window and start the analysis session.

8 Manipulation

The aim of this step is to set the occlusion for the casts and create the virtual model setups.

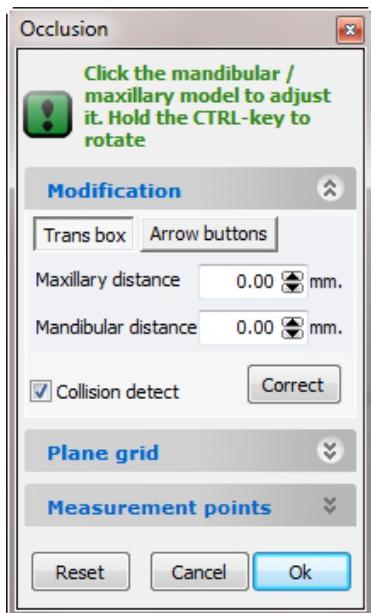


The **Manipulation** tab contains three steps: **Occlusion**, **Alignment for open model set** and **Virtual Setup**. These steps are described in details below.

8.1 Occlusion

The **Occlusion** step helps to align the upper and the lower virtual casts.

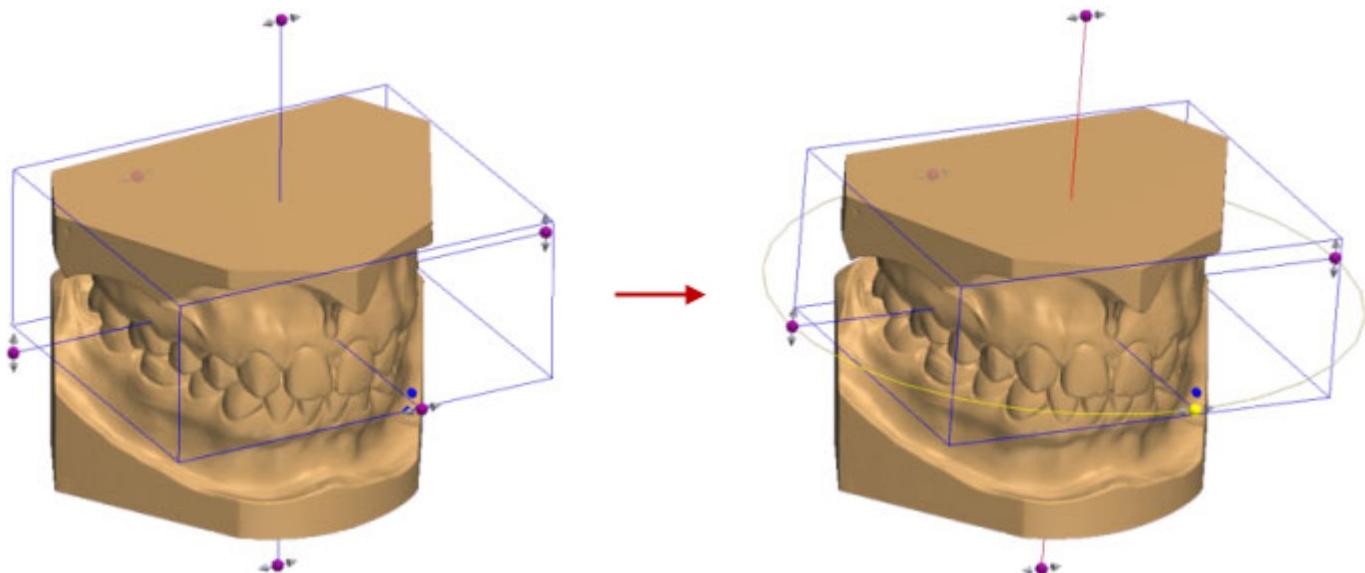
1. Click the **Occlusion** button on the **Manipulation** tab. Follow the hints provided in the dialog box below.
2. Edit positions of the virtual casts in relation to each other using the following options:

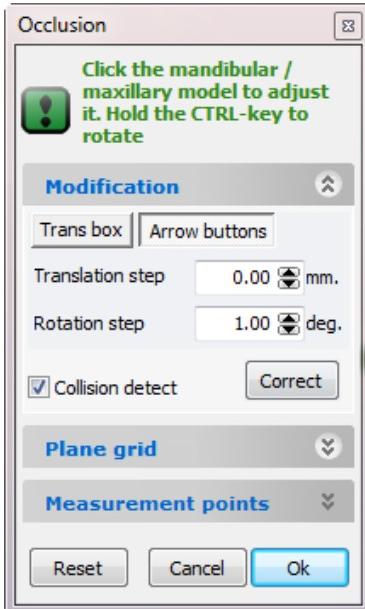


- **Trans box:**

- 1) Click on either the upper or lower casts to visualize the corresponding bounding box.
- 2) Drag the purple control points on the ends of the axis arrows (turn yellow) to set up the ultimate position of the cast.

Enter the necessary values for the **Maxillary distance** and **Mandibular distance** to move the upper and the lower casts up and down.





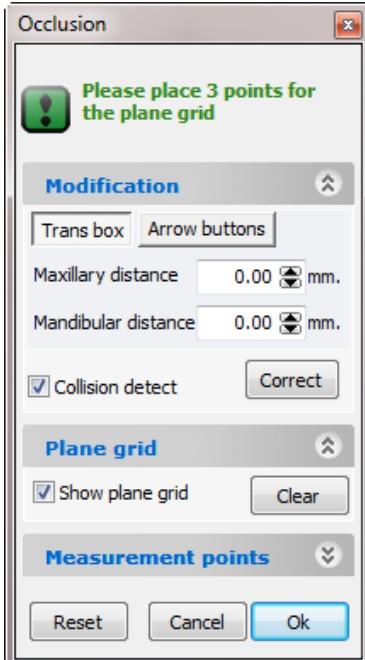
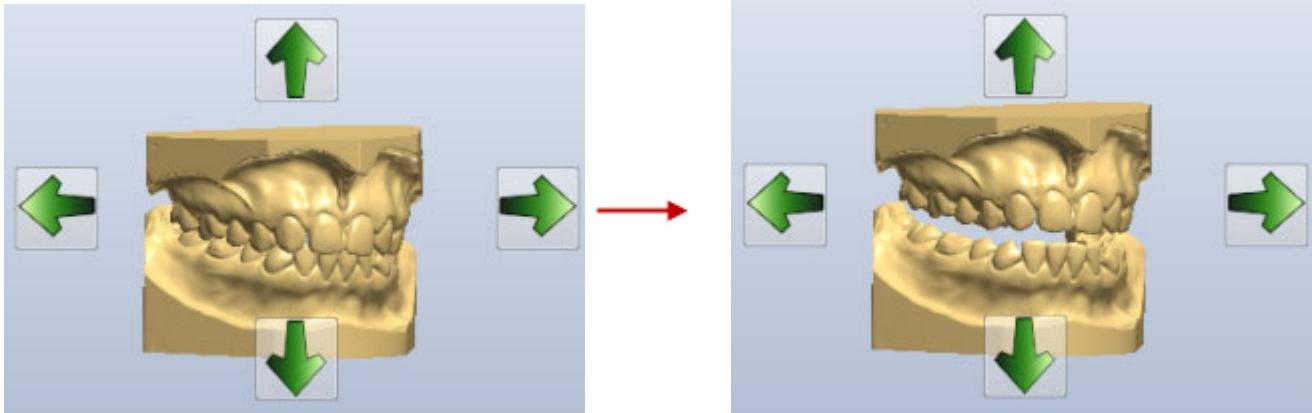
- **Arrow buttons:**

- 1) Click on either the upper or lower casts to visualize the green arrows.
- 2) Click on one of the four arrows to set up the ultimate position of the cast. Hold the CTRL key to rotate.

Transition step – sets up the distance for which the cast moves up or down at one click on the arrow.

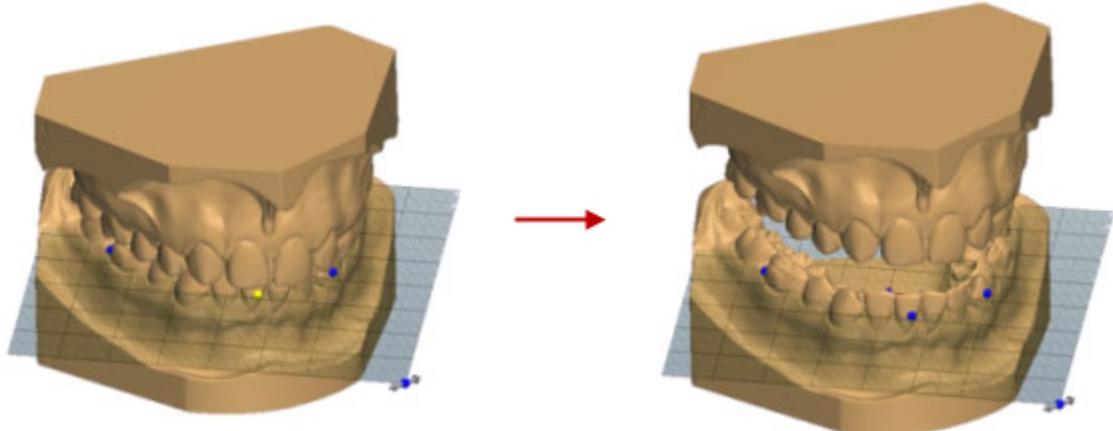
Rotation step

– sets up the degree of rotation of the model.



- **Orientation plane:**

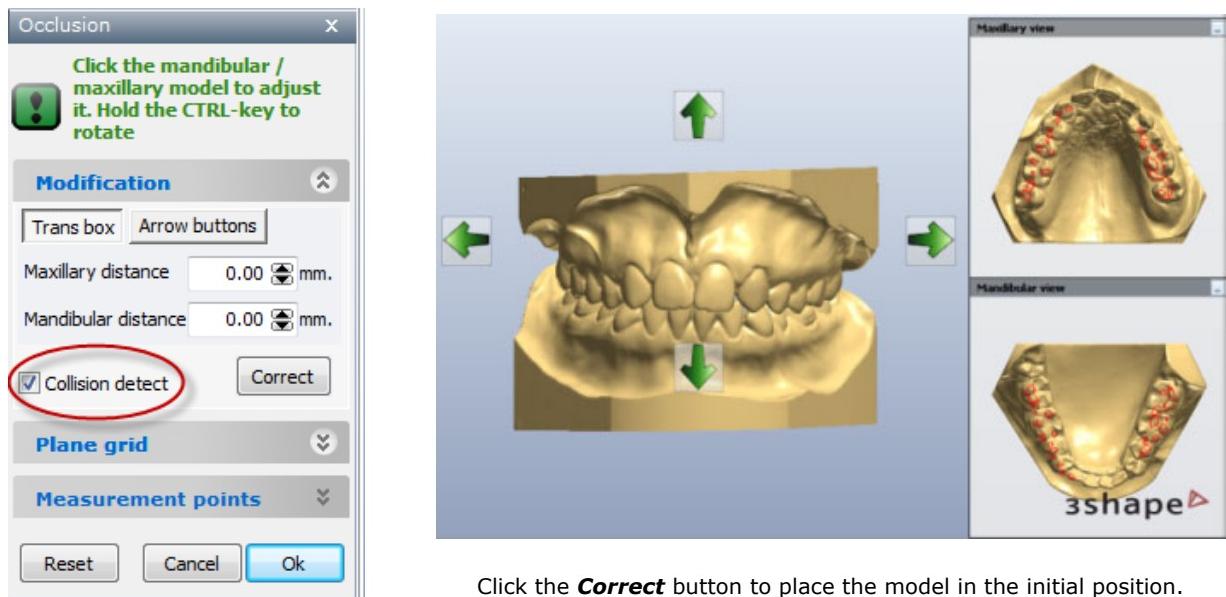
- 1) Customize the orientation plane with the help of the three control points – check the **Show plane grid** checkbox, and select three points on the models defining the plane.
- 2) Define the distance between the two virtual casts to be moved apart according to the orientation plane. Negative values make the cast move up, positive – down. To edit the position of the plane, drag the control points correspondingly.
- 3) Click **Clear** to clear the control points that define current positioning of the orientation plane and re-define it.



3. Detect collisions and repeat step 2 trying to avoid them, if applicable.

HINT: Due to difficulty to access interproximal areas for most orthodontic cases it can be necessary to adjust the suggested segmentation manually. In case segmentation fails for one given tooth, it is recommended to start by repositioning the distal and mesial points at the first step.

If this is not sufficient to solve the segmentation issue, it can also be very useful to inspect the cutting splines alone on screen (disable the **Show maxilla** or **Show mandible** button respectively from the Visualization Toolbar and adapt the spline using the **Spline Fast Edit** mode.



Click the **Correct** button to place the model in the initial position.

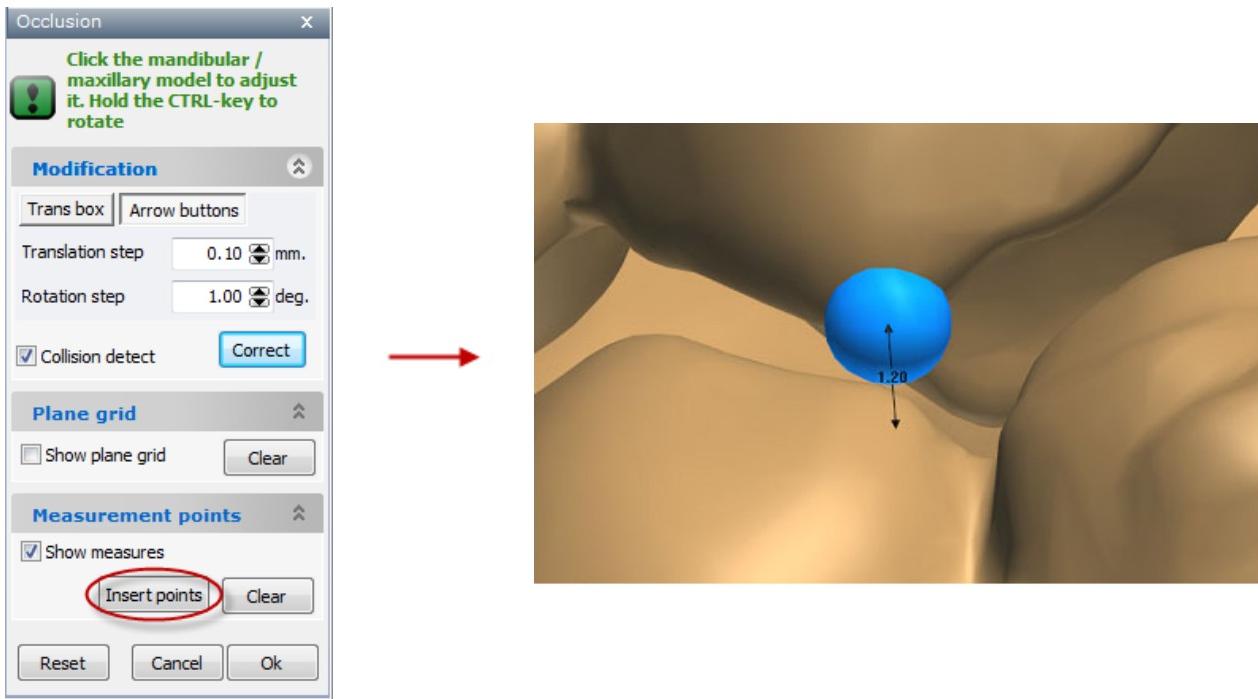
4. Use the following buttons to control saving and clearing the changes applied:

- Click **Reset** to reset all changes and start aligning the virtual casts all over.
- Click **Cancel** to cancel the last change and leave the step.
- Click **OK** to save the changes and leave the step.

5. Inspect the changes at specific points.

- In the **Measurement point** group click **Insert points**.
- Click on the models to define points of interest – the difference at these points will be shown with labels on the models.

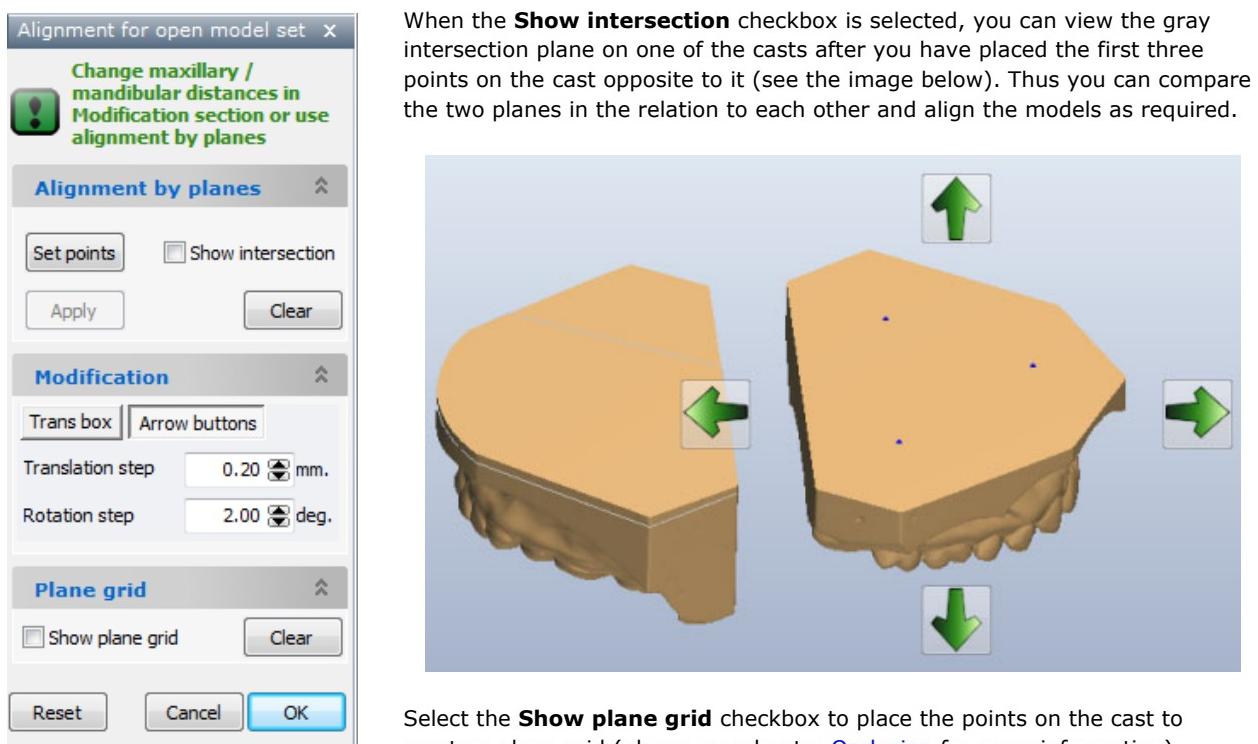
- When changing the model articulation the distance moved for every specified point will be shown as a measurement label on the models.



8.2 Alignment for Open Model Set

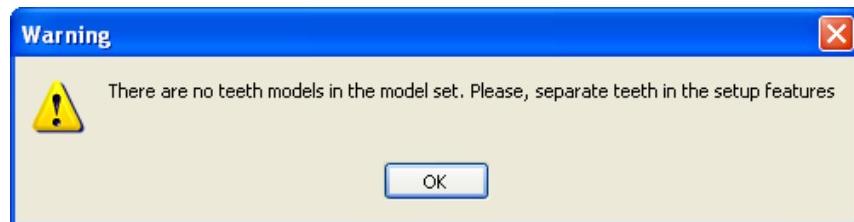
The **Alignment for open model set** function helps to align the upper and the lower casts for the open model. Follow the hints written on the form in green to perform the alignment.

You can use either the **Modification** section to insert the desired distances for the alignment (please see chapter [Occlusion](#) for more details) or the **Alignment by plane** section. To use the latter one, please click on the **Set points** button and place 3 points on each of the casts. Click the **Apply** button to perform the alignment. Click **Clear** to place the points all over again. Click **Reset** to start the alignment from the beginning.



8.3 Virtual Setup

 **Virtual Setup** is a feature simulating the orthodontic treatment in OrthoAnalyzer. In order to move the teeth to simulate a treatment, a segmentation cut is automatically suggested and performed when the teeth are defined at the model Preparation step as described in [Preparation for Maxillary Model](#) chapter otherwise, you will get the following warning message for unsegmented teeth when the **Virtual Setup** button is clicked:



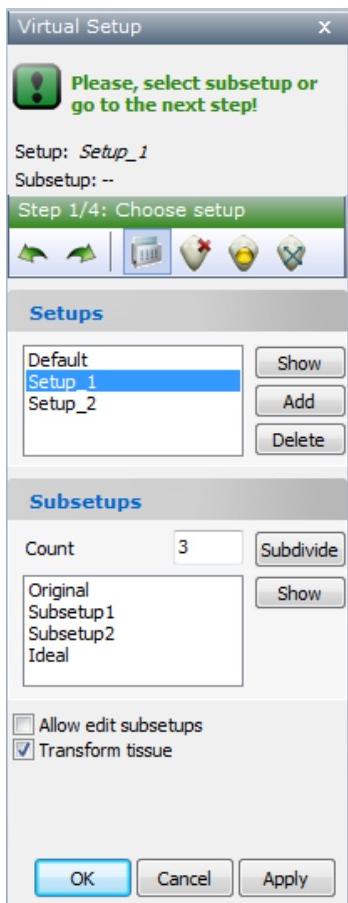
At the **Virtual Setup** step, you can create different setups and subsetups with the teeth being extracted, moved etc, compare the created setups when desired and obtain a precise summary of all teeth movements.

The Virtual Setup function contains the four steps:

- 1/4: Choose setup
- 2/4: Extract teeth
- 3/4: Set objects
- 4/4: Move teeth

The four steps are described further.

8.3.1 Choose Setup



The first step  **Choose setup** offers you to create new setups (scenarios) and subsetups or choose the existing ones. Please follow the hints written in green on the form as shown on the image.

When you first come to this step the only setup available is the default one. You can create a new setup by clicking the **Add** button. Enter a name for the new virtual setup in the pop-up window and click **OK**.

If you want to create subsetups for your scenario, enter the number of subsetups desired in the **Count** field and click **Subdivide**. The program will automatically create the desired number of subsetups named Subsetup1, Subsetup2 etc. When you first go to the **Choose setup** step the only subsetup available is the Original and after you create your own setup or subsetups, there also appears the Ideal one, which is the final setup.

Click **Show** to view your setups, click **Delete** to remove them.

Allow edit subsetups checkbox, when selected, lets you make changes to your subsetups.

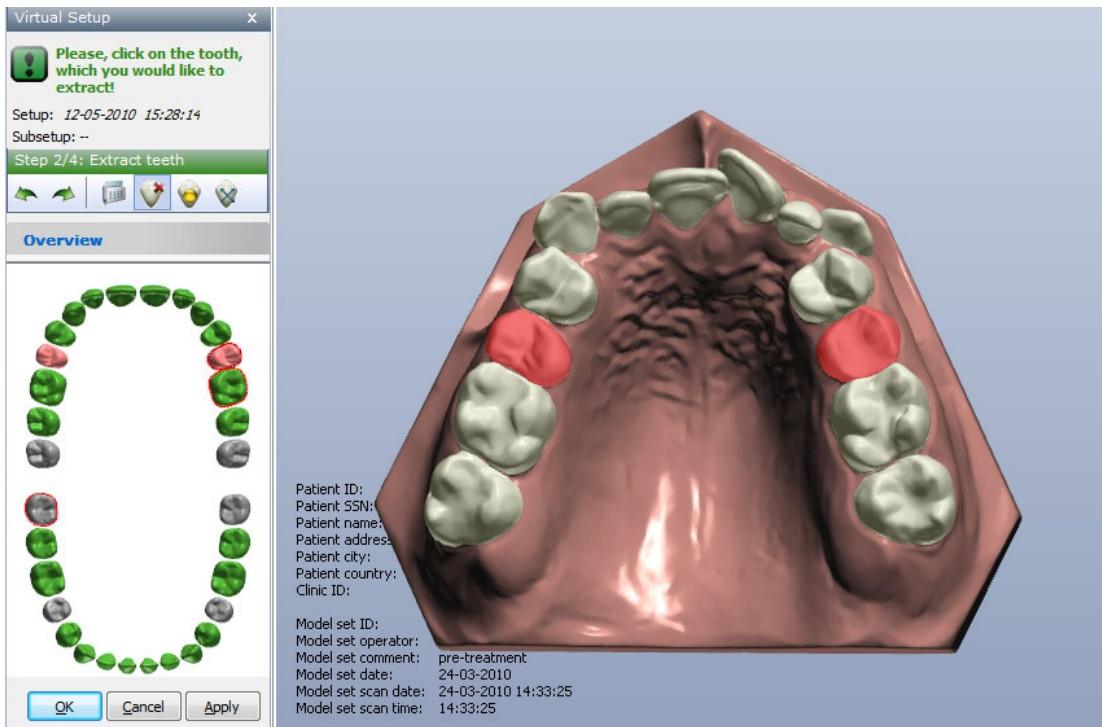
If you want the tissue (the pink material of the gums) to be moved when moving the teeth, select the **Transform tissue** checkbox.

When done with creating or choosing setups, click either the  **Next step** or  **Extract teeth** button to proceed to the next, **Extract teeth** step.

8.3.2 Extract Teeth

At the second step of the Virtual Setup, the  **Extract teeth** step, you can simulate teeth extraction. To perform the operation, left-click on the teeth you want to extract, the selected teeth will turn red (in the session window and in the Overview form). To unselect a tooth, left-click on it once more. Click **Apply** to perform the extraction.

Click either the  **Next step** or  **Set objects** button to move to the next step.

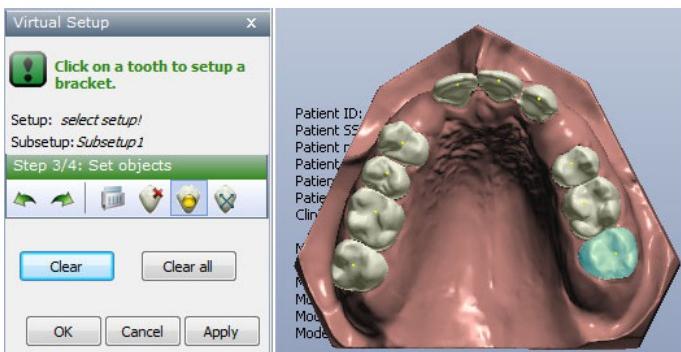


8.3.3 Set Objects

At the third step of the Virtual Setup, the  **Set objects** step, you are asked to click on teeth to define a bracket position. Click on the teeth one by one (the active tooth turns blue) and place the yellow points on each of them.

To clear the bracket from the selected tooth, click the **Clear** button, to remove all brackets, click the **Clear all**.

Click either the  **Next step** or  **Move teeth** button to go to the next step.

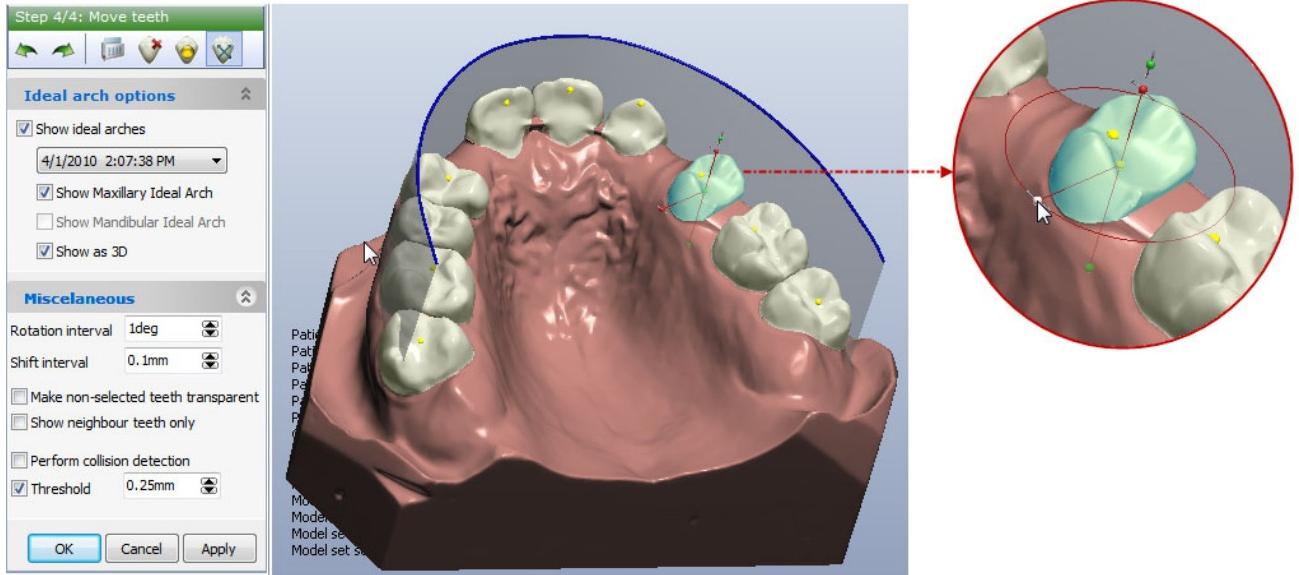


8.3.4 Move Teeth

At the last step of the Virtual Setup, the  **Move teeth** step, you can rotate and move teeth as desired. To select the tooth, click on it with the mouse or use the arrow buttons on the keyboard. The selected tooth turns blue. Double click on the tooth to activate the red and green control points that will help you rotate and move the tooth as shown on the image.

To rotate the tooth: click on the red control points on the tooth or use the Left / Right arrow keys.

To move the tooth: to move the tooth up and down click its green control point and drag it or use the Up and Down arrow keys; to move the tooth sideways click tooth and drag it or use the arrow + Ctr keys.



Ideal arch options tab: To view the ideal arch, select the **Show ideal arch** checkbox. This will activate the whole tab and you can select the desired arch and choose to view the maxillary and mandibular arches by selecting the corresponding checkboxes. Select the **Show as 3D** checkbox to view the arch in the 3D format.

Miscellaneous tab: Setup the desired rotation and shift intervals in the corresponding fields. For better visualization of the selected tooth you can choose to make the non-selected teeth transparent or view only the neighboring teeth. When the **Perform collision detection** checkbox is selected, you can view the collision of the casts. Choose the threshold of the collision if desired and enter the necessary values.



In the right bottom corner of the session window you will find the four view buttons. You can use them to view the selected tooth from the top, front, left side or right side, or click the following keyboard buttons respectively: **Home**, **End**, **Delete** and **Page down**.

Tooth panel

- Show all
- Show selected tooth only
- Show all without selected tooth
- Show teeth only
- Show jaw without teeth
- Use active tooth rotation center
- Show original for selected tooth
- Show tooth markers

Movements - 10

Inclination	0.0 deg	<input type="button" value="Edit"/>
Angulation	-2.4 deg	
Rotation	0.2 deg	
Left/Right	2.09 mm	
Forward/Backward	-1.07 mm	
Extrusion/Intrusion	0.47 mm	

[Teeth movements overview >>](#)

At the right top corner of the session window you will find the **Tooth panel** with different visualization options. By selecting/unselecting the first five checkboxes you can show/hide some specific parts of the model for better visualization.

Use active tooth rotation center – When checked, rotates the model using the rotation centre of the selected tooth.

Show original for selected tooth – When checked, recreates a shadow of the original position of the tooth.

Show tooth markers – Shows/hides the markers on the teeth.

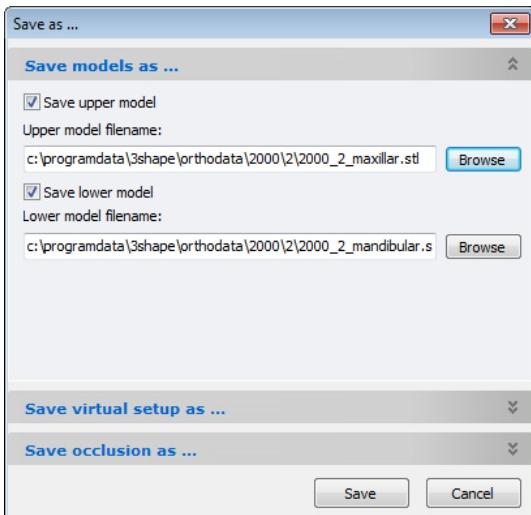
The **Movements** tab contains information of the operations performed on the selected tooth. After you have rotated or moved the tooth, the corresponding values appear in this tab showing exact measurements. These values can be changed directly in the tab by clicking on the desired field. Click the **Teeth movements overview** link to get a full report on the teeth manipulation:

Tooth movement overview						
	Rotation	Angulation	Inclination	Left/Right	Extrusion/Intrusion	Forward/Backward
1					0.0 mm	
10	0.2 deg	-2.4 deg	0.0 deg	2.1 mm	0.5 mm	-1.1 mm
11	-5.5 deg	-1.0 deg	0.1 deg	0.4 mm	0.4 mm	-0.1 mm
12					0.0 mm	

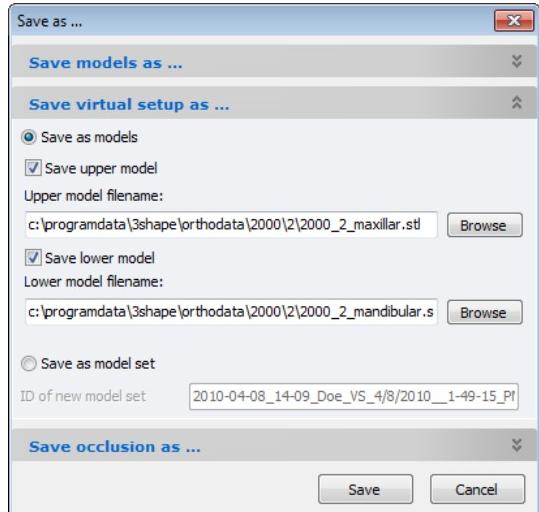
Click **Apply** to apply the changes. You can go back and forward within the steps with the green arrow buttons . Click **OK** to finish the **Virtual Setup** step.



The **Export models as...** button in the Main toolbar allows saving the models and setups to a specific folder. Left-click on it to get a *Save as...* window.



The **Save models as...** option saves a copy of the existing upper and/or lower model(s) to the specified folder



The **Save virtual setup as...** option has two options: you can save the upper and/or lower model(s) as models or as a model set.



The **Save occlusion as...** option saves the occlusions.

9 Configuration



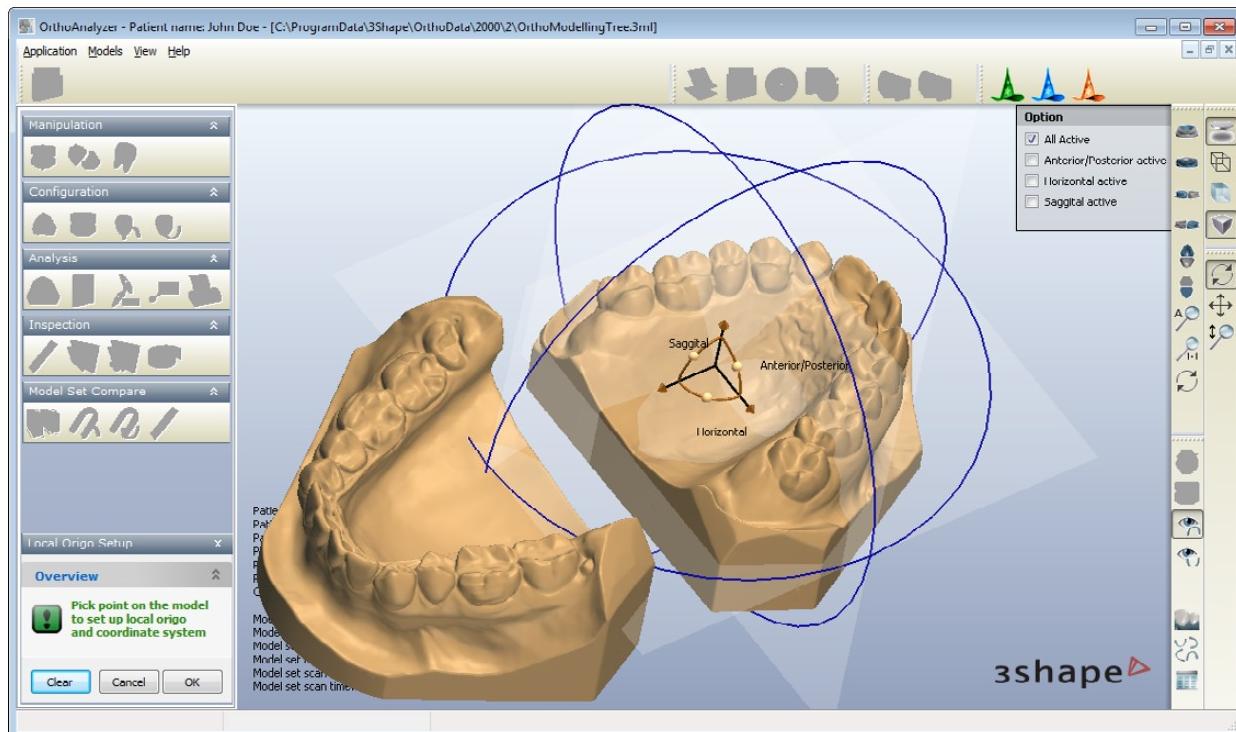
The aim of this step is to prepare the upper and/or lower model(s) for future manipulations and analysis.

The **Configuration** tab contains four steps: **Setup maxillary model local origo**, **Setup occlusion plane**, **Preparation for maxillary model** and **Preparation for mandibular model**. These steps are described in details below.

9.1 Setup Maxillary Model Local Origoo

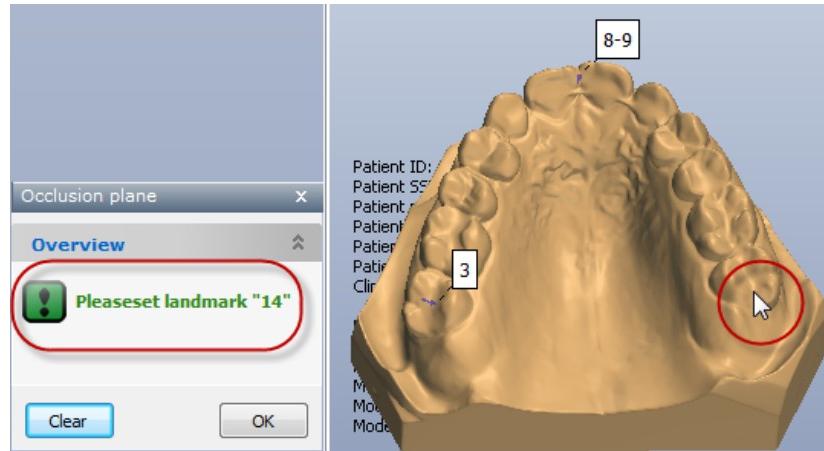
The aim of this step is to specify the local origin for the maxillary model of the virtual cast, which provides a fixed plane for cross-section preview. The local origo also defines the three planes to be used by default in cross-section inspection.

1. Click the **Setup maxillary model local origo** button in the **Configuration** tab.
2. Pick a point on the maxillary model to set up local origo and coordinate system.
3. Rotate the model using the mouse:
 - Drag the control points (they turn yellow when activated) to rotate coordinate axis freely and set up the appropriate relation of the local origin planes.
 - Drag the arrowhead to move the horizontal plane up or down.
 - Drag the arrowhead to move the sagittal plane left or right.
 - Drag the arrowhead to move the vertical plane to or from.
4. When needed, you can click the **Clear** button reset the positioning of the planes and start the process over. Click **OK** to save the changes made to the local origin and leave the step.

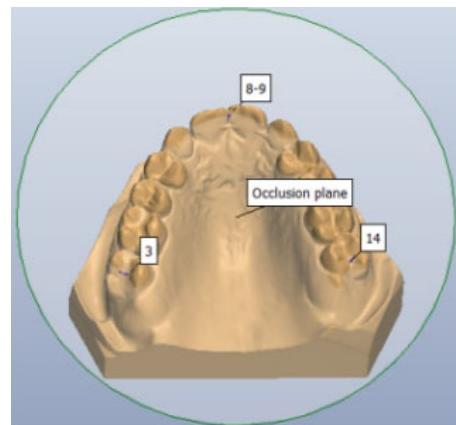


9.2 Setup Occlusion Plane

The  **Setup occlusion plane** step allows you to place the occlusion plane that is used for the 2D measurements at the [Analysis objects](#) step (**Custom spline 2D**, **Measure 2D** and **Distance 2D**). To setup the plane, please follow the hints on the form (see the image below). You will be asked to place 3 landmarks on the teeth number 3, 8-9 and 14.



When done, the occlusion plane appears on the cast:



Click **Clear** to reset the plane or click **OK** to save and finish the step.

9.3 Preparation for Maxillary Model

This step has a multiple purpose: it lets you define the composition of the maxillary tooth row, including missing teeth. It also segments the teeth according to their definition so you can perform a virtual setup. You can also set up the width measurements for missing or non erupted teeth.

Completing this step is crucial for the further analysis and for virtual setup operations to be successfully performed in the Function panel.

The  **Preparation for maxillary model** option contains three steps:

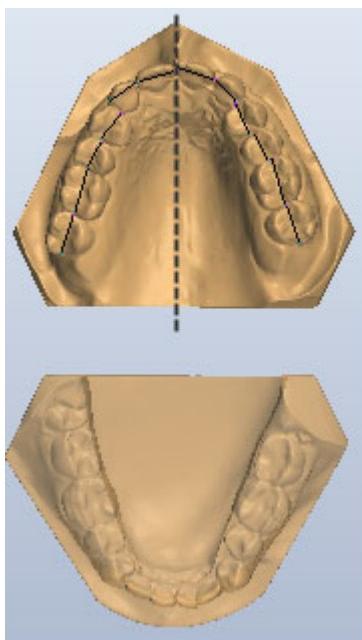
- 1/3: Set points
- 2/3: Define cut
- 3/3: Finish

These steps are described in details below.

9.3.1 Set Points

When you first click on the  **Preparation for maxillary model** icon, the program automatically brings you to the first step -  **Set points**.

The system automatically presents the model of an open mouth view, making the inactive part of the virtual cast transparent (as shown on the image).



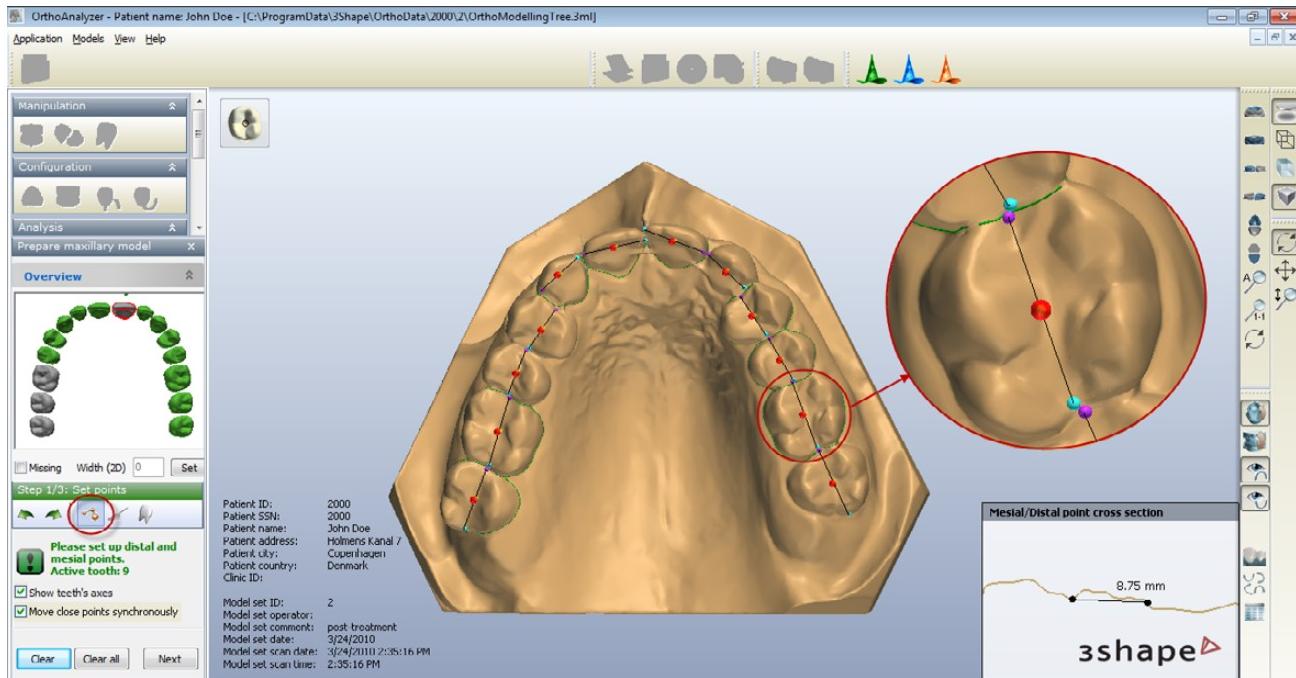
At this step, you have to place the distal and mesial control points on the teeth to setup the maxillary model. To accomplish this task, mentally divide the model in two parts along the median line, and indicate the mesial points (aqua) on the surface of the tooth that is away from the median line, and the distal points (purple) – on the surface that is towards median line as shown on the image below. The width value for each tooth is displayed under **Width (2D)** under the Overview window.

To remove the tooth width selection, right-click on the control point and select **Delete** from the appeared menu.

To move the control points, click on the control point to activate the tooth and drag the point with the cursor.

Click on the tooth and press **Clear** to remove the selected tooth width.

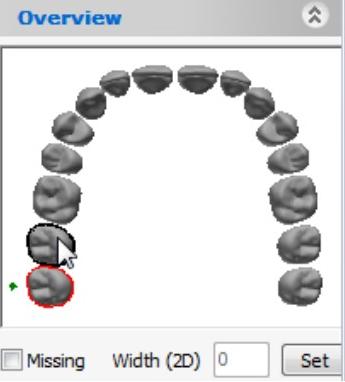
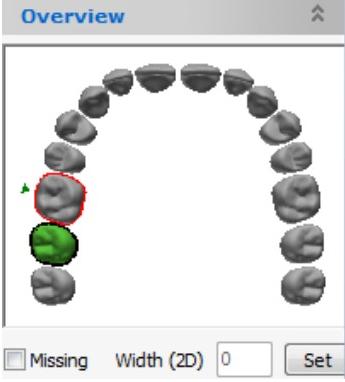
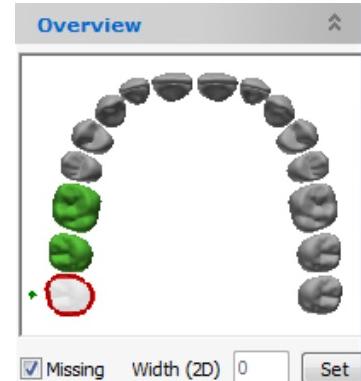
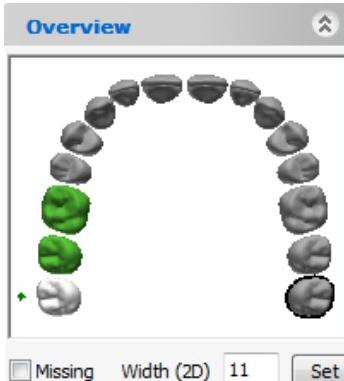
Click **Clear all** to remove all the width measurements.



The user point-of-view should be the growing direction of the tooth. The default axis of the tooth crown is defined by the distal-mesial segment you define here. Normally it is the default top-view plane for the 2D measurements and for most teeth for 3D measurements.

If some teeth grow in a non-standard direction, the plane for 3D measurements should be selected according to those individual directions.

Use the *Overview* window to navigate around the teeth:

<p>The small green arrow indicates the tooth selected. Its number appears under Active tooth below. The tooth marked with cursor becomes circled black.</p>	<p>The next tooth which is automatically selected as 'active' is marked red. The tooth selections for which are completed becomes green.</p>
	
<p>To mark the tooth which is missing (becomes transparent, select the tooth and check Missing.</p>	<p>If the space left from missing tooth is intended for specific purpose (e.g. implant or non-erupted tooth), click the Set button and enter the corresponding tooth size value in the Width (2D) field. The virtual tooth becomes white.</p>
	



Additionally, you can manipulate the teeth with the right-click menu appearing in the Overview window when the cursor is positioned over a tooth.

The default measurements are done in 2D mode as the software emulates the traditional manual measurement method. The dental technician can still use the manually calculated data with the 2D tooth width. The measurement method can be toggled between 2D and 3D with the **Use 2D tooth length** checkbox located on System Settings page of the Ortho Control Panel.

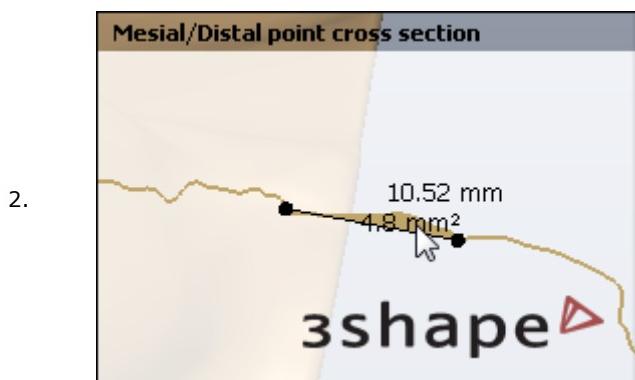
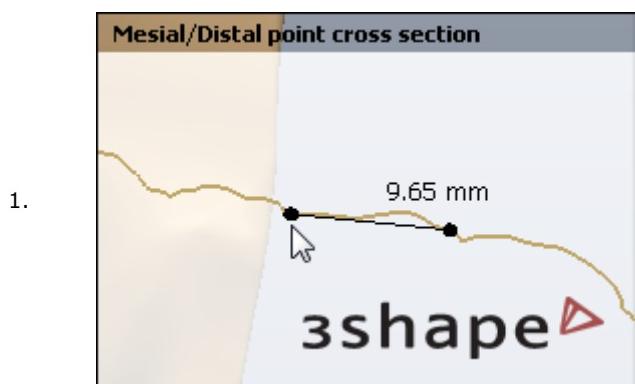
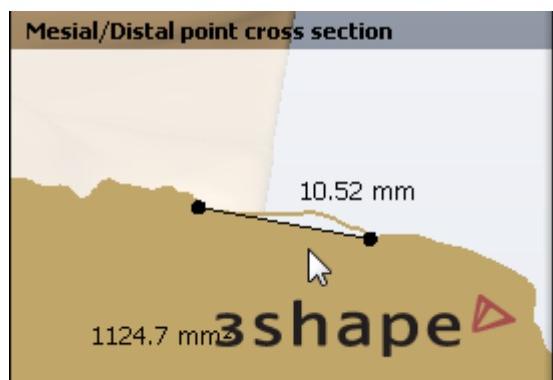
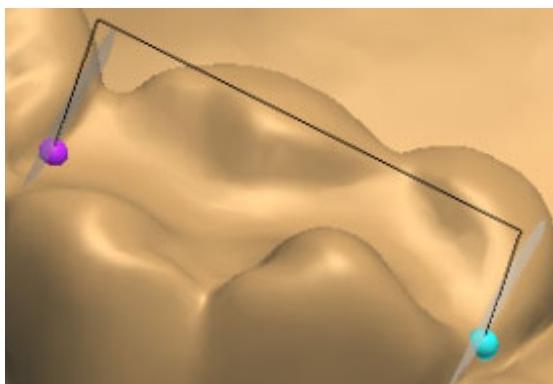


Show teeth's axes – when checked, displays the teeth axes in the form of the red arrows. The tooth axis can be changed with the help of the [Set tooth normal](#) button in the upper left corner of the session window. Its position is by default set by the user-defined mesial-distal segment.

Move close points synchronously – when checked, simultaneously moves the control points that are set close together on the spline (used at the [Define cut](#) step).

Use the *Mesial/Distal point cross section* window at the bottom right corner of the session window for the following tasks:

1. Drag the control points in the cross-section window to move them along the cross-section defined by the mesial and the distal points on the virtual model in the modeling window while the cross section tooth width is calculated automatically.
2. To measure the cross-section areas of the tooth width segment, position the cursor over the area and see its value displayed while the field turns beige.



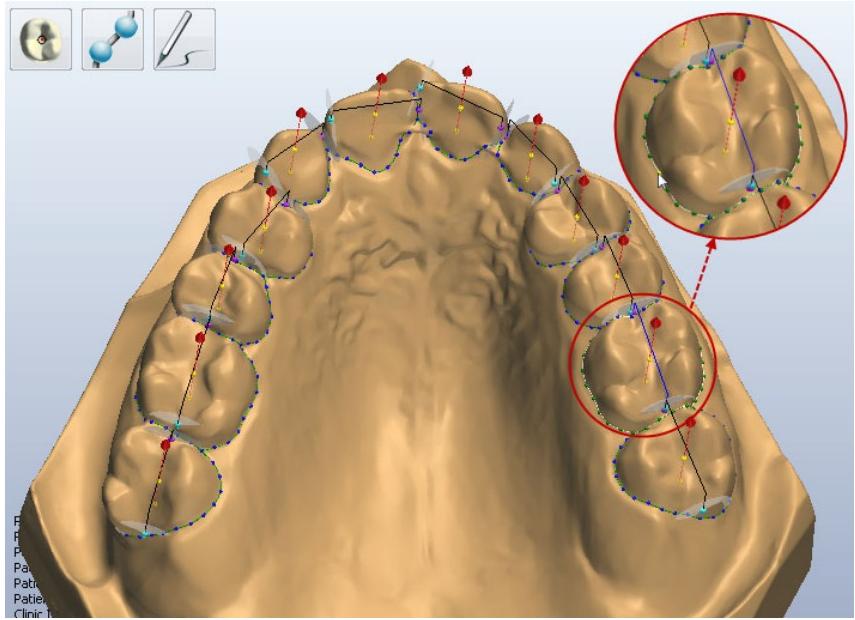
To move to the next step, you can click either the **Next step**, **Define cut** or **Next** buttons.

9.3.2 Define Cut

At the **Define cut** step you can adjust the cut spline or recreate it manually. The program automatically creates the spline for each tooth based on the mesial/distal points placed at the previous step.

To adjust the spline, click desired tooth in the *Overview* window to activate it. The control points of the active tooth turn green from blue. Click on the control points (turn yellow when active) and drag them with the mouse to form the desired spline. Select the **Move close points synchronously** checkbox to move simultaneously the control points that are set close to each other. When you need to delete a control point from the spline of the selected tooth – right-click on it and select **Remove** from the appeared menu.

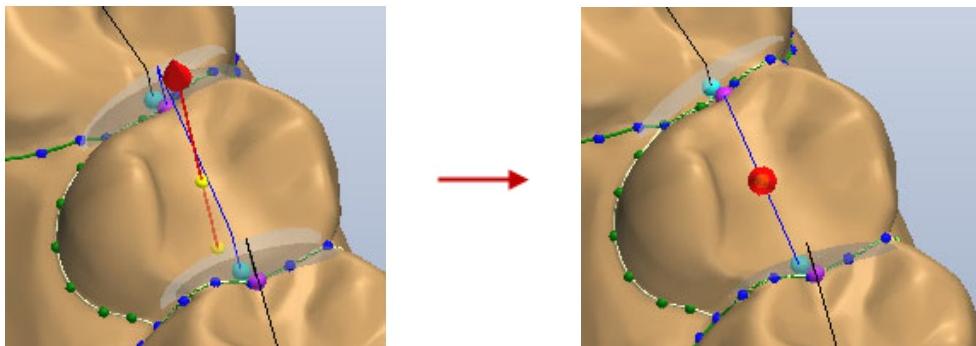
To create the spline manually or to edit it using the fast edit mode, you can use the buttons in the upper left corner of the session window – **Segment tooth manually** and **Spline fast edit mode**.



Set Tooth Normal



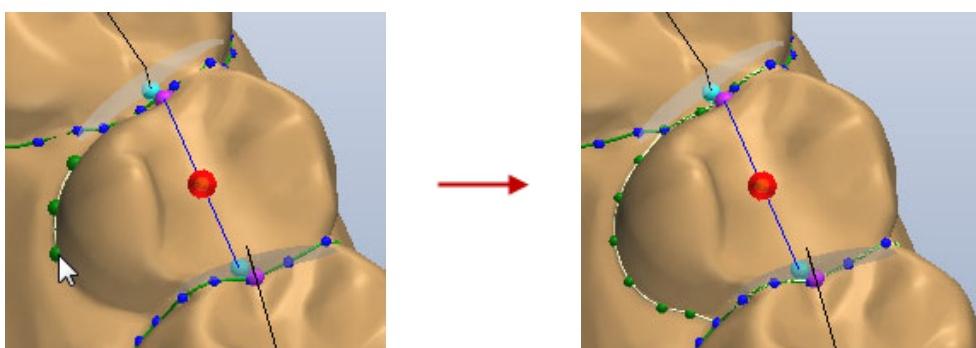
When the **Show teeth's axes** checkbox is selected, the teeth axes become visualized in the form of the red arrows. The tooth axis can be changed with the help of the button in the upper left corner of the session window. To perform the operation, select the tooth to make it active, position the cast as desired and click the **Set tooth normal** button. Note that the default position of the tooth axis is defined by the mesial-distal segment.



Segment Tooth Manually



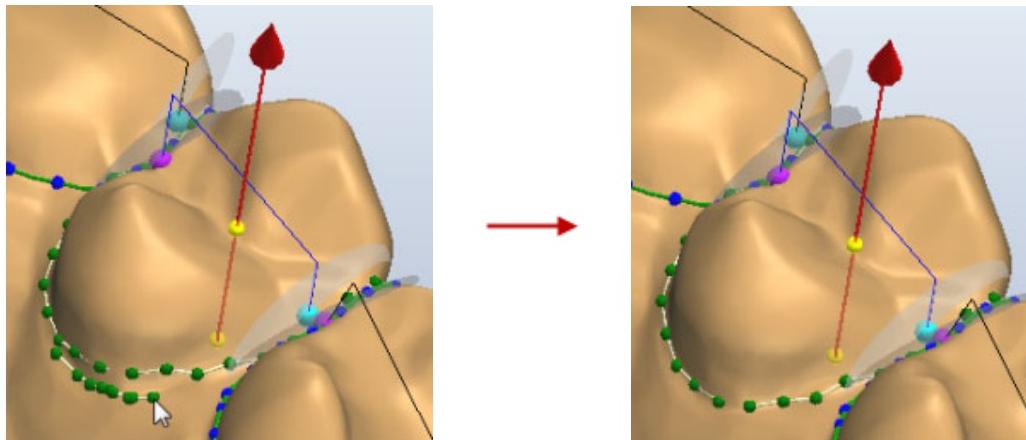
To place a new spline, select the desired tooth to make it active and click **Segment tooth manually** button. The spline that has been placed automatically by the program will disappear and you will be able to place your own spline. Left-click on the tooth to place the control points. The last control point should be placed on top of the first one to close the spline.



Spline Fast Edit Mode



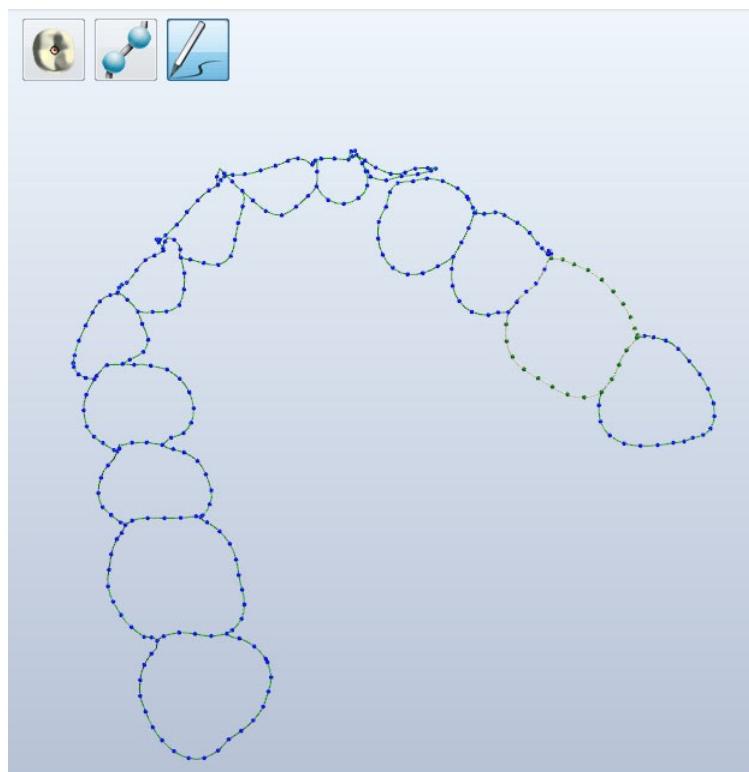
To fast edit the spline, select the desired tooth to make it active and click the **Spline fast edit mode** button. Click and draw the new part of the spline that needs correction and the program will adjust the spline.



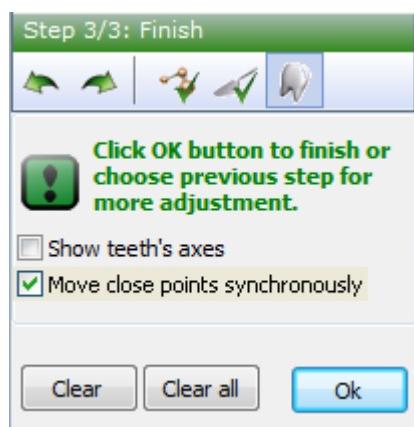
When you want to remove the preparation information from a tooth, click on the tooth in the Overview window and click the **Clear** button. The **Clear all** button removes the preparation information for all teeth at once.

To move to the next step click either the **Next step, Next** or **Finish** buttons.

HINT: Due to difficulty to access interproximal areas for most orthodontic cases it can be necessary to adjust the suggested segmentation manually. In case segmentation fails for one given tooth, it is recommended to start by repositioning the distal and mesial points at the first step. If this is not sufficient to solve the segmentation issue, it can also be very useful to inspect the cutting splines alone on screen (disable the **Show maxilla** or **Show mandible** button respectively from the Visualization Toolbar and adapt the spline using the **Spline Fast Edit** mode.



9.3.3 Finish

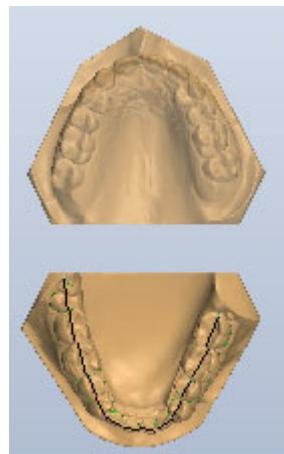


At this last step of the **Preparation for maxillary model** option you can evaluate your model and choose to go back to the previous steps if more adjustments are needed.

To go back to any of the previous steps, click on the step icon or on the green arrow buttons .

Click **OK** to finish the **Preparation for maxillary model**.

9.4 Preparation for Mandibular Model



This step defines the composition and segmentation of the tooth row of the mandibular model. The workflow is similar to the described in the [Preparation for Maxillary Model](#) chapter.

10 Analysis



This functional tab serves the purpose of comparing particular patient models to statistically obtained ideal deviations in order to plan the treatment accordingly.

The **Analysis** tab contains five steps: **Dental arc analysis**, **Analysis reports**, **Overbite/Overjet**, **Analysis objects** and **Generate report**.

10.1 Dental Arc Analysis

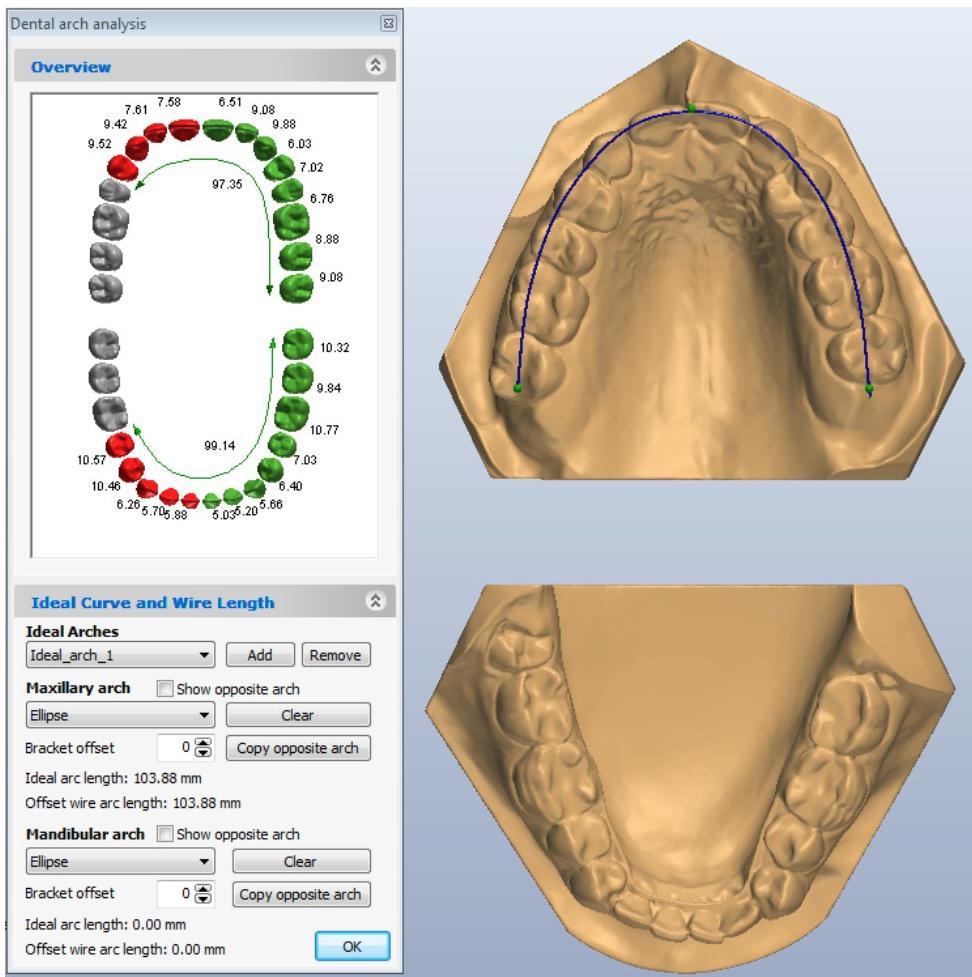
The **Dental arc analysis** function provides a compilation of the tooth width calculations based on the selections made in the **Configuration** tab and compares it with the customer-defined ideal curve shape.

When you click the **Dental arc analysis** button, a dialog box with the *Overview window* and the *Ideal Curve and Wire Length* tab appears.

Overview window

The teeth of the maxillary and mandibular right quadrants are marked red. The teeth of the maxillary and mandibular left quadrants are marked green. Missing teeth are marked grey.

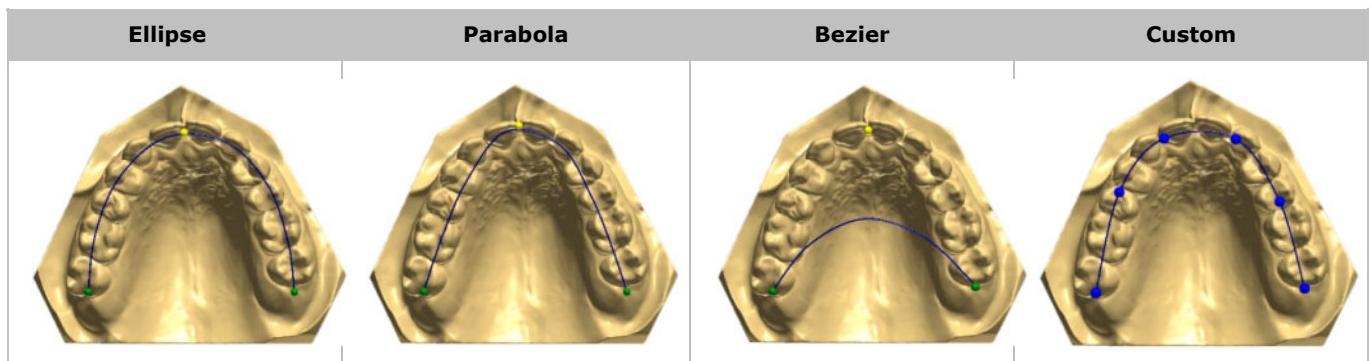
The green arrows along the dental arcs indicate the full arch width calculated out of the individual tooth widths of the teeth marked in the previous steps. Both types of measurements appear next to the teeth and the arrow in mm.



Ideal Curve and Wire Length tab

Before defining an arch, you have to click the **Add** button and enter a name for your new ideal arch (arches). The new arch will appear in the **Ideal Arches** drop-down list. You can delete the selected arch with the **Remove** button.

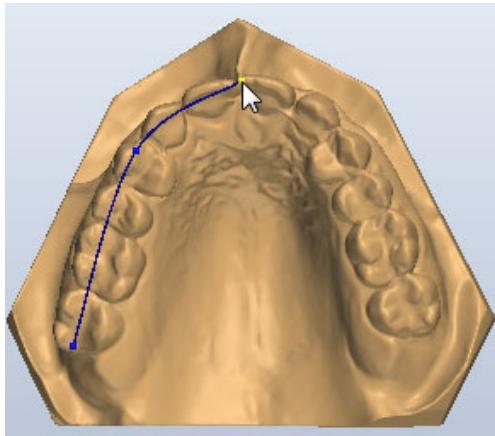
The **Maxillary arch** and **Mandibular arch** tabs offer the following options (the same for the upper and the lower arches). Define an ideal arch based on different default shapes. There are four types of ideal curve shapes available in the system:



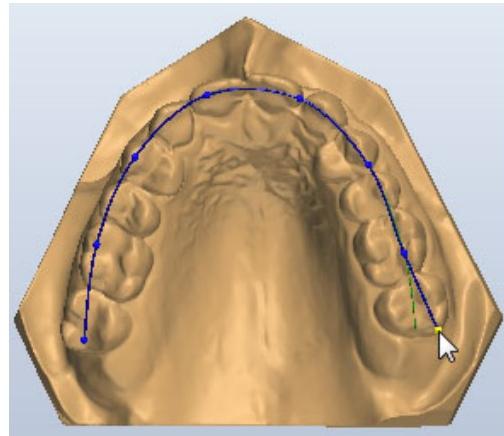
Compare the existing shape of the teeth row with an ideal curve and consider the necessary modifications to the existing shape.

Select the arch shape and place several control points on the model to set up the ideal curve: two points for **Ellipse** and **Parabola** (the third point will appear automatically creating an arch) and four points for **Bezier** and **Custom** as shown on the image.

To change the shape of the spline, change the position of the selected control points with the help of the cursor. For the custom made ideal curve, the original spline is marked green, whereas the current spline turns blue, for comparison as shown on the image.

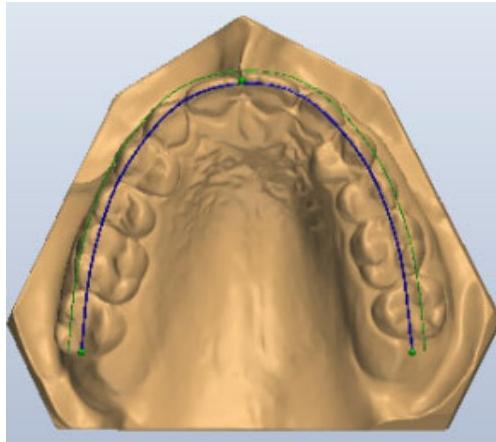


Placing control points for the **Custom** arch



Editing the **Custom** arch

Click **Clear** to remove the arch. Click **Copy** opposite arch to get a copy of the arch from the opposite cast. Select the **Show opposite arch** checkbox to show/hide the arch on the opposite cast.



If necessary, define the distance between the ideal curve and the bracket in the **Bracket offset** box. The Bracket offset value corresponds to the thickness of the orthodontic appliance (e.g. the brackets), whereas the **Offset wire arc length** corresponds to the length of its metal wire. Entering both positive and negative values is possible in **Bracket Offset**.

Compare the **Ideal arc length** (blue) and the **Offset wire arc length** (green) values, to define the treatment measurements, if any. If the offset value equals zero, then the lengths coincide. In the example above, the original length of the upper tooth row spline is 103.89mm, whereas the offset value of 2mm changes the offset length to 109.63mm.

Click **OK** to finish Dental arc analysis.



HINT: Using the 1:1 real scaling  of the Visualization Toolbar, you can easily replicate a physical arch wire by drawing it on screen with the Custom Arch option.

5.2 Analysis Reports

The option **Analysis reports** is provided to enable effective and versatile analysis of the models. OrthoAnalyzer provides three officially recognized analyses: **Tooth width analysis**, **Bolton analysis** and **Space analysis**. The option of comparing both, the maxillary and mandibular teeth rows with the pre-set, standard values is enabled with the data imported into the Ortho Control Panel.

 Click the **Analysis reports** button in the **Analysis** tab to open a window containing the **Overview** section illustrating the information presented in the three dental analysis tabs. In the **Overview** window, the teeth of the maxillary and mandibular right quadrants are marked red, the teeth of the maxillary and mandibular left quadrants are marked green and the missing teeth are marked grey.

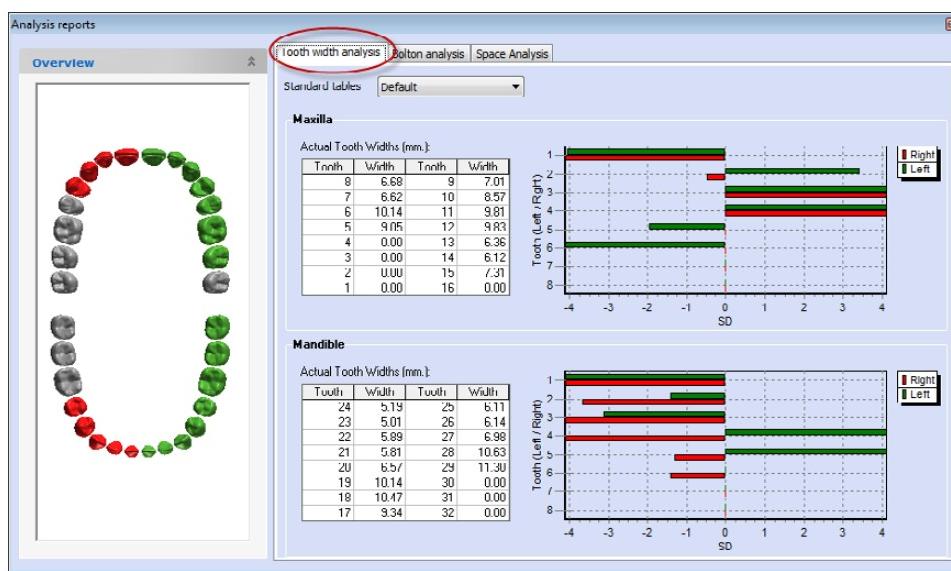
1. The Tooth width analysis tab appears in focus automatically when you open the **Analysis reports**, it contains the data for this type of analysis as shown on the image below. To view a different type of the standard tables, select it from the **Standard tables** drop-down menu.

The **Tooth width analysis** presents a list of the actual individual tooth widths compared to the standard average values in order to determine the locations and amounts of the tooth-width discrepancies. New standard tables may be imported into the **Material settings** of the Ortho Control Panel.

SD = Actual TW - Average TW

*TW - tooth width

Comparing the actual and the average tooth width values, the user can calculate the standard deviation between them (marked SD on the graphs).



Tooth width analysis

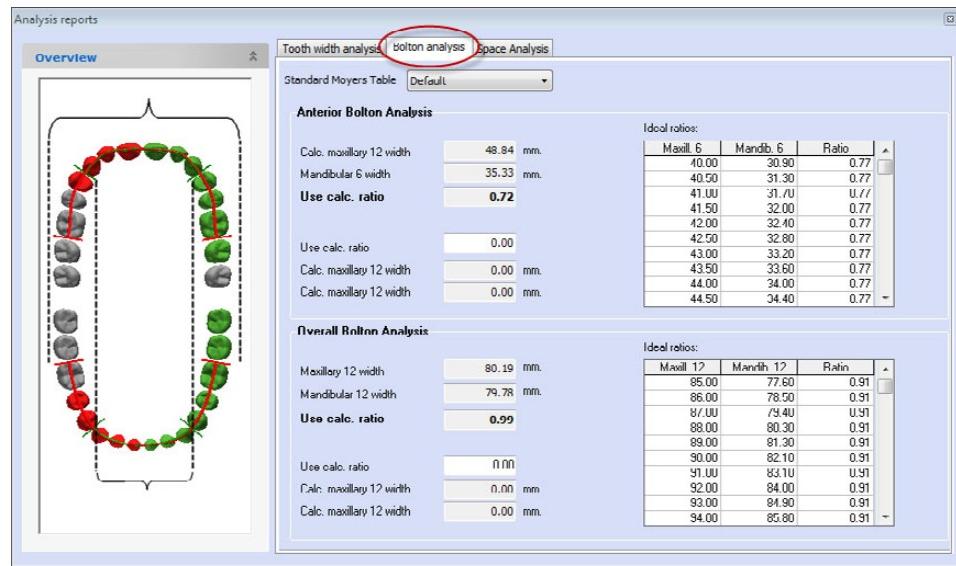
2. Click the Bolton analysis tab to view the table data available for this type of analysis.

The red spline in the **Overview** window is divided in three sections. It highlights the six front teeth and the twelve teeth closest to the labial surface on each of the models for the anterior and the overall Bolton analyses correspondingly (see the image below).

The tables automatically shown in this tab are reproduced by default. Specific to the patient model of an individual, the **Anterior** and **Overall** ideal ratios are customized and easily imported into the Ortho Control Panel.

According to the example in the tables, the ideal AR for the ethnic group to which the patient belongs equals 0.77 whereas, its ideal OR equals 0.91.

Based on the ratios of the maxillary and mandibular six and twelve widths of the current model, the system calculates the **AR** and **OR** deviations from the standard ratios for the given ethnic group. It is possible to predict the necessary measures to adjust the structure of the whole teeth row in order to provide the orthodontic treatment.



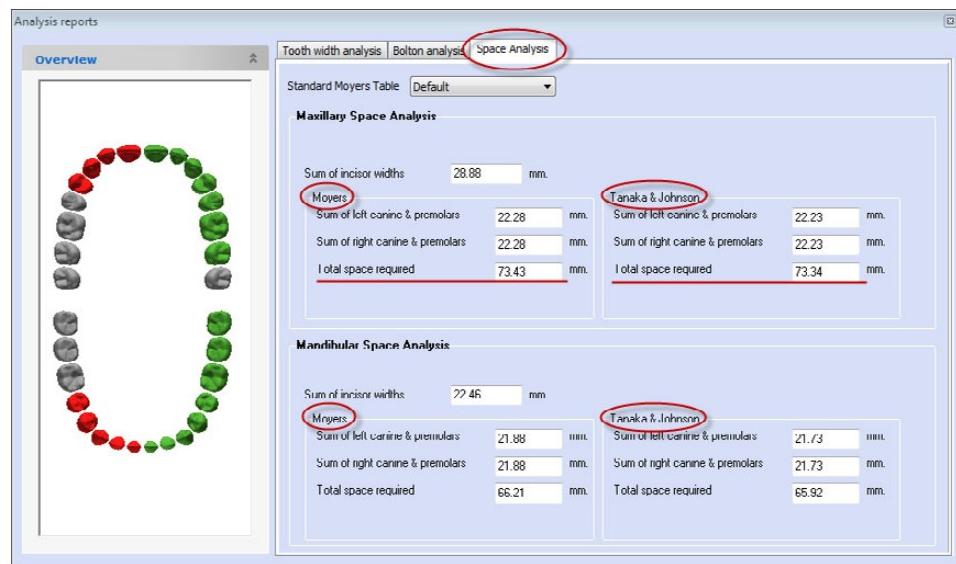
Bolton analysis1. Overall analysis (twelve width) 2. Anterior analysis (six width)

3. Click the **Space analysis** tab to view the table data available for this type of analysis.

This section provides two types of space analysis – the **Moyers** and the **Tanaka & Johnston** table analyses for both the maxillary and the mandibular arches. This is done to predict the orthodontic manipulations with the spaces indicated in the setup section of the analysis process.

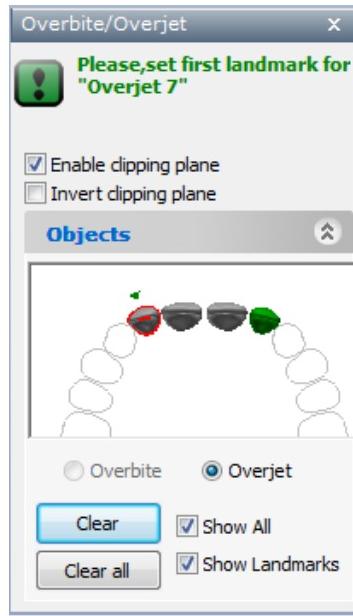
The **Standard Moyers table** is selected by default. To switch to a different type of the standard Moyers table, select it from the **Standard Moyers Table** drop-down list. This is customizable in Ortho Control Panel.

Having calculated the sums of the incisors, canines and premolars separately, the system yields a set of Moyers and Tanka & Johnston values for the **Total space required**.



Space analysis

10.3 Overbite/Overjet



The **Overbite/Overjet** function allows you to measure the overbite and overjet distances. Please follow the hints in the form to perform the measurements.

The **Objects** window in the form contains an overview of the teeth to be measured. Click on the teeth in the **Objects** window to select them for operation. The **Overbite** function is available only for the central incisors and is not active for the lateral incisors (see the image).

The selected tooth is circled in red. The teeth that have already been measured become green.

Place the landmarks on the necessary teeth in the session window or in the 2D cross section (see images below). You can always move the landmarks by dragging them with the cursor.

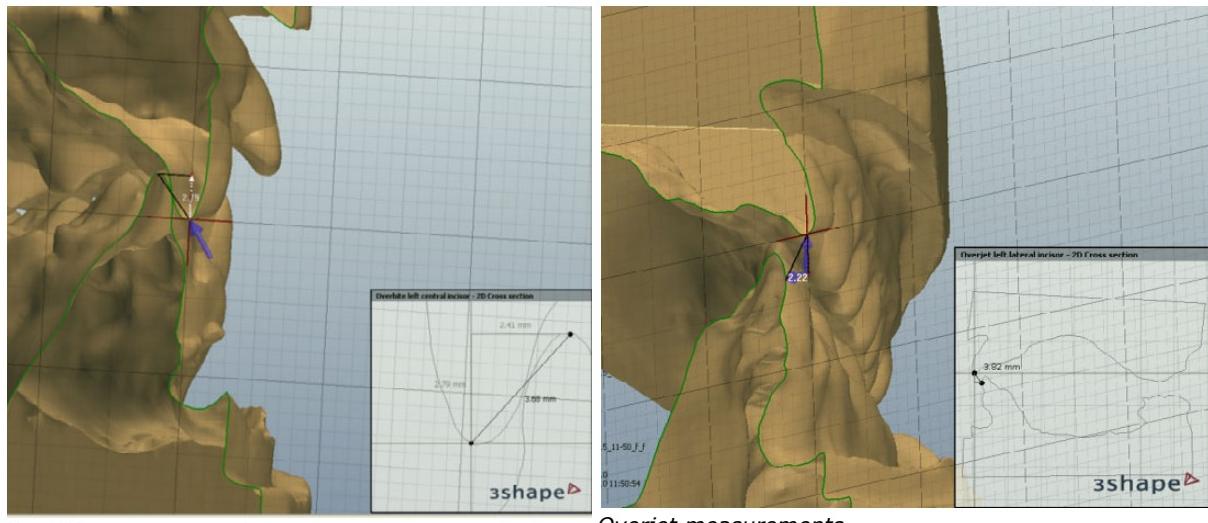
Enable clipping plane – When selected, cuts away the portion of the model (see images below).

Invert clipping plane – When selected, cuts away the opposite portion of the model.

Select **Show all** to view all the overbite/overjet measurements on the model.

Select **Show landmarks** to show/hide the landmarks on the model.

Click **Clear** to remove the measurements from the selected tooth. Click **Clear all** to delete all the measurements on the model.



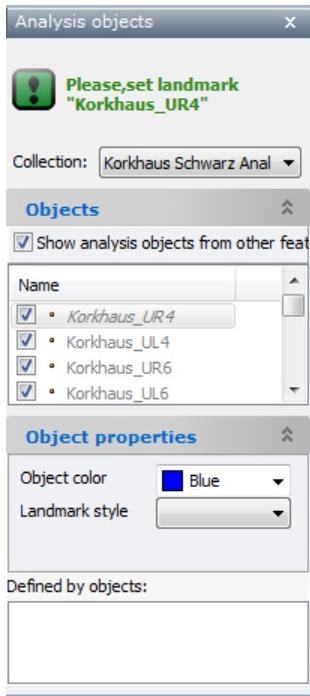
Overbite measurements

Overjet measurements

10.4 Analysis Objects

For this analysis, you need to set up additional landmarks: points, angles and planes in order to perform the required measurements on the model set.

Click the  **Analysis objects** button and follow the hints provided in the dialog box.



The system guides you through the steps specific to the **Collection** selected from the drop-down list for example, the *Korkhaus Schwarz Analysis* collection.

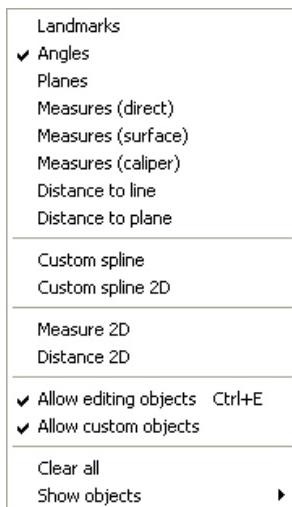
If object (e.g. angle) is defined by other objects (e.g. point landmarks), the list of these defining objects appears in the **Defined by objects** window when the main object is selected in the **Objects** list.



Object color and Landmark style markings are fully customizable.

Tick off the **Show analysis objects from other features** checkbox to visualize the measurements and analysis from other steps (e.g. **3d spline**).

If you choose to select a landmark collection, select the name of the collection previously set up in the Ortho Control Panel for the **Collection** menu and the objects from the **Objects** list. Once the objects comprising the collection have been set, you may also add custom objects.



If you choose to set up **custom objects**:

- Right-click the session window and choose the type of landmark object from the list of available.
- Place objects on the model and review measurement values. These will be employed in the analysis reports at the following steps.

Landmarks

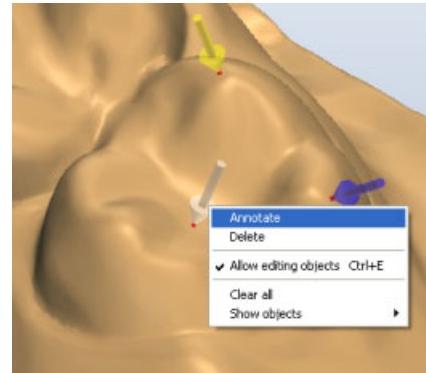
Landmarks represent simple (red) points that define angles, occlusion planes, cross-sections, sections for measurements etc., thus, making up to all the analysis objects enabled by the system.

The arrow-like surface markers help you navigate around the landmarks:

 **Blue** markers define a passive selection.

 **Yellow** markers indicate the selected objects. Their positions can be changed by dragging the corresponding marker.

 Right-click the marker to display the function menu for its landmark. The marker will become **white**. At this point, it is possible to annotate the landmark selected typing in a different name, which will automatically be displayed in the **Objects** list in the dialog box.



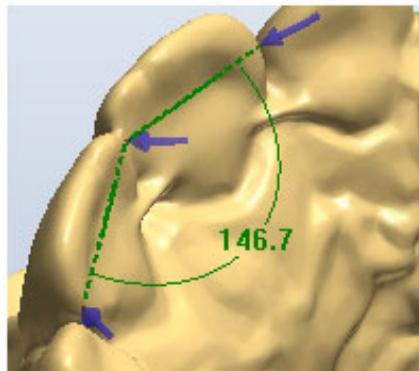
Angles

Angles are defined by three landmarks and the measurements which are immediately displayed.

The value of the angle is shown in the dialog box in degrees. It may be converted into radians with the help of the **Use radians** checkbox.

Right-clicking the angle or the angle name in the **Objects** list displays the list of editing functions available for the angle. Selecting **Redefine** clears out the angle landmarks and allows you to place new.

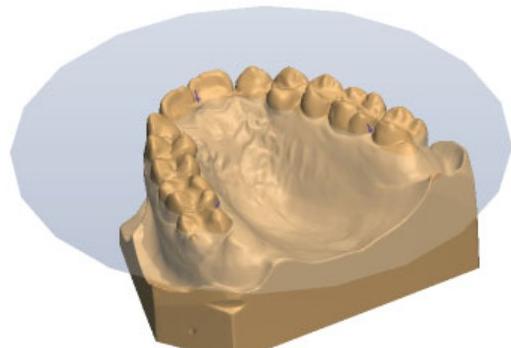
The characteristics and functions specific to landmarks, as described above, are preserved everywhere throughout the analysis objects.



Planes

The plane is a cross-section defined by three landmarks.

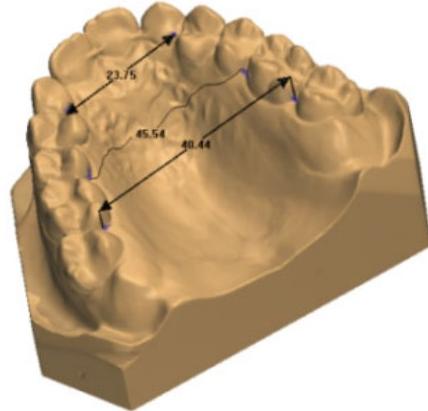
The principles and options employed in editing the plane are identical to the ones employed in editing the angle.



Measures

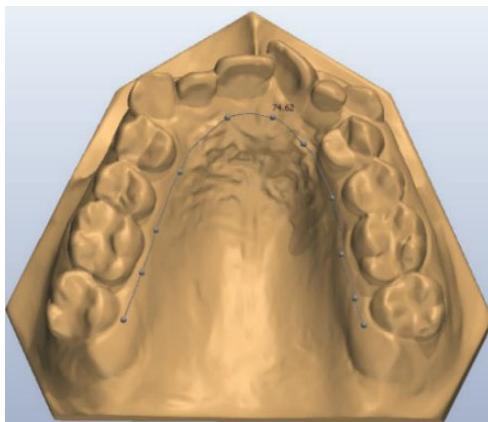
The measure is a distance between two landmarks measured with one of the following methods: direct, surface and calliper.

The measure value is automatically calculated and shown in (mm) in both, the dialog box and the session window.

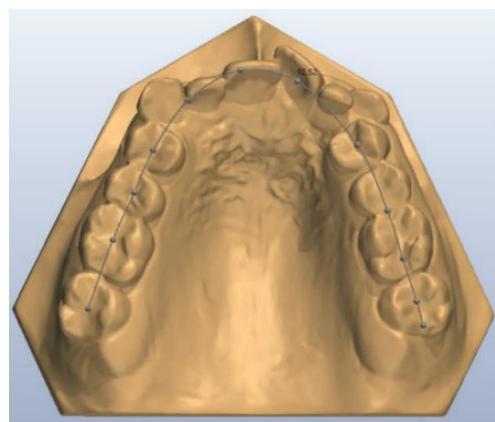


The right-click in session window cursor menu also offers:

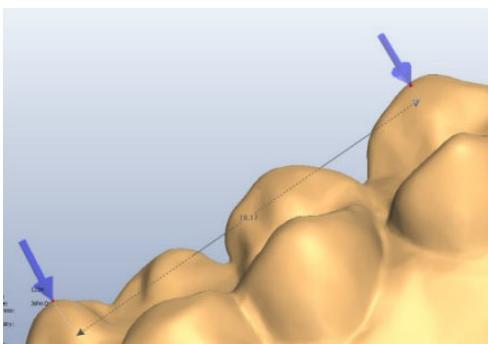
Custom spline



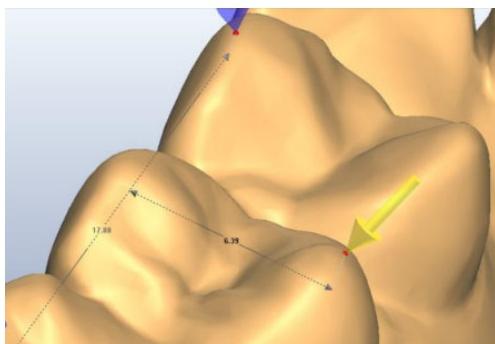
Custom spline 2D



Measure 2D



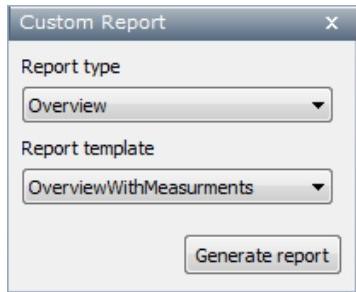
Distance 2D



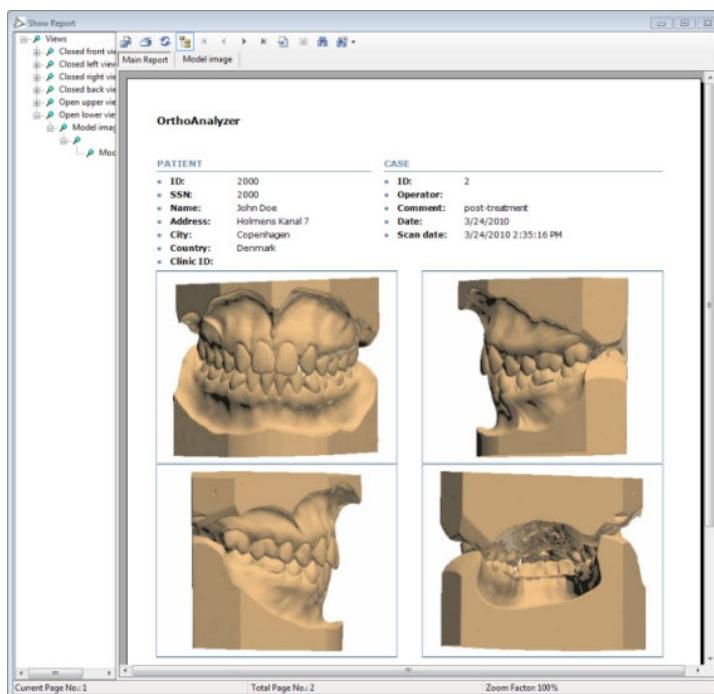
- **Allow editing objects** (checked by default): Allows changing object position and employing other customizable settings.
- **Allow custom objects** (checked by default): Allows placing custom objects on the model.
- **Clear all**: Clears all the objects both in the session window and in the **Objects** list.
- **Show objects**: Allows for selective visualization of specific types of objects.

10.5 Generate Report

The **Generate report** function organizes the data contained in both, the **Configuration** and **Analysis** sections into a separate printable document.



1. Click the  **Generate report** button on the Analysis tab.
2. In the appeared *Custom Report* dialog box, select the **Report type** you wish to make, the report type depends on the information you need to include in the report. Report types and their structures can be defined in the Ortho Control Panel: *Feature Settings->Custom Report Configuration*.
3. Select the desired **Report template**.
4. Click **Generate report** to load it in a separate window.
5. You can explore the report using various visualization tools in the top toolbar.
6. The report can be **Exported** to a folder in .rtp format and print it out, if needed.



	Export report
	Print report
	Refresh
	Toggle group tree
	Navigate around the pages
	Go to a specific page
	Close current view
	Search for text
	Zoom

Toggle group tree: the displayed Analysis report consists of the two main parts – **Views** (**Configuration** section in OrthoAnalyzer) and **Analysis** (**Analysis** section).

The rest of the group tree structure specifies the multiple parts of the sections covered here (model images).

Close current view: active when displaying a model image; does not apply to the Main Report

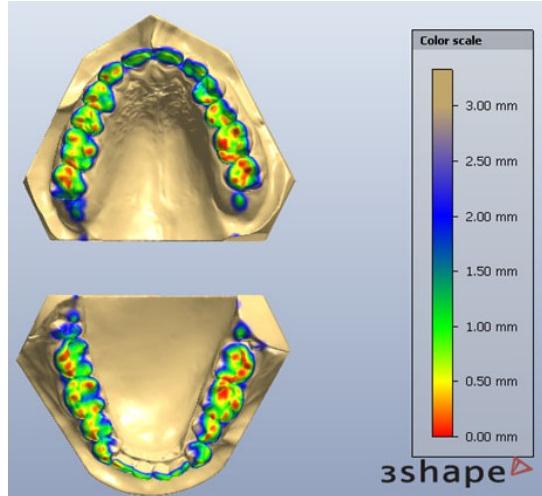
11 Inspection



The **Inspection** tab is responsible for analytical tasks which can be performed directly on models without prior selections in the **Configuration** part.

The **Inspection** tab contains four steps: **Occlusion map**, **Cross-section**, **Cross-section along dental arc** and **3D distance**. These steps are described in details below:

11.1 Occlusion Map

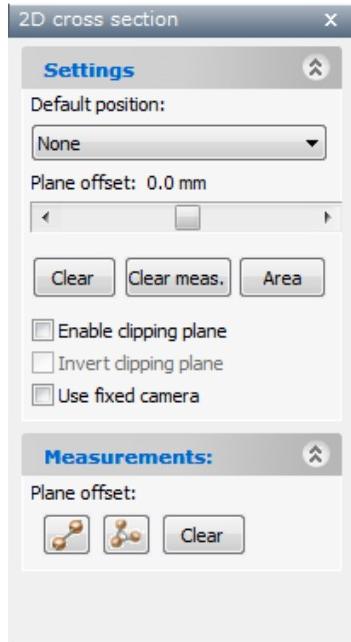


The **Occlusion map** enables visualization of occlusal distances in the model set.

Click the **Occlusion map** button on the **Inspection** tab. The system will automatically color the virtual casts according to the **Color scale** displayed on the right of the session window.

The areas of the teeth closest to the occlusion surface are marked red, gradually changing to the colder color palette, as the occlusion distance becomes larger.

11.2 Cross Section



The **Cross-section** function enables the user to select the appropriate area for a detailed 2D cross-section inspection and on-grid measurements of the customizable cross-section plane.

Click the **Cross-section** button on the **Inspection** tab. The dialog box appears on the left and the **2D Cross section** view on the right of the main session window.

Select one of the predefined positions for the cross-section plane from the **Default position** drop-down list. The type **None** enables a customer defined plane.

The **Plane offset** scroll bar allows you to move the cross-section plane back and forward from the initial position, with the actual distance values being indicated.

To see the inside of the plane, mark the **Enable clipping plane** checkbox.

To see the other side of the clipping plane, mark the **Invert clipping plane** checkbox.

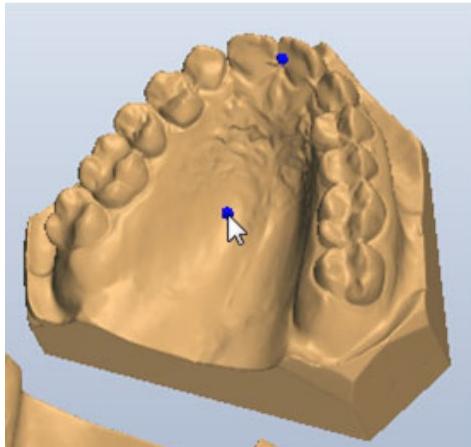
Mark the **Use fixed camera** checkbox to fix the plane while moving the model.

Click **Clear** to remove the plane.

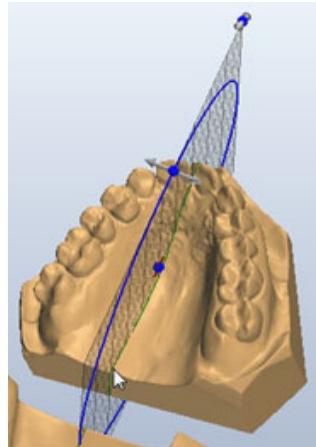
You can define the cross-section plane with one of the two options:

1. Define a custom cross-section plane:

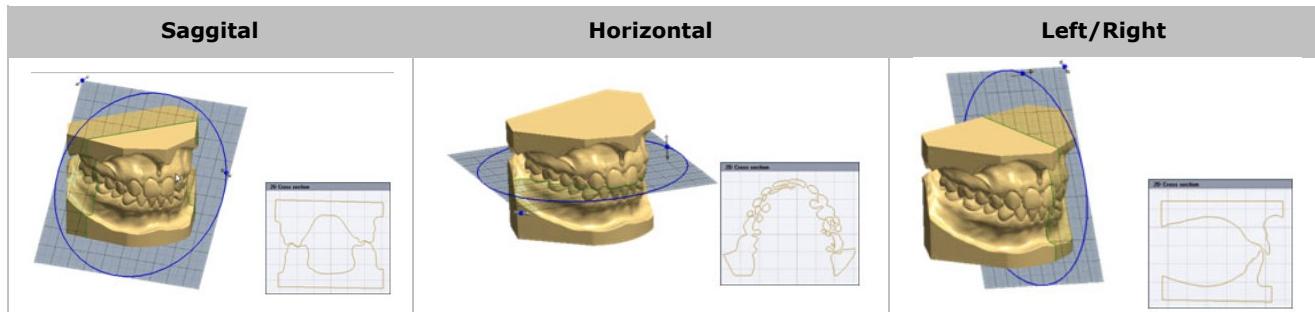
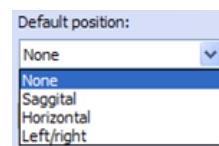
Define the cross-section plane by placing three blue control points.



Once the last control point is placed, the system automatically displays the cross-section plane going through the indicated control points.



2. Select a pre-defined Default position in the 2D cross section form:



Navigate around the plane to select the most appropriate position and the slope:

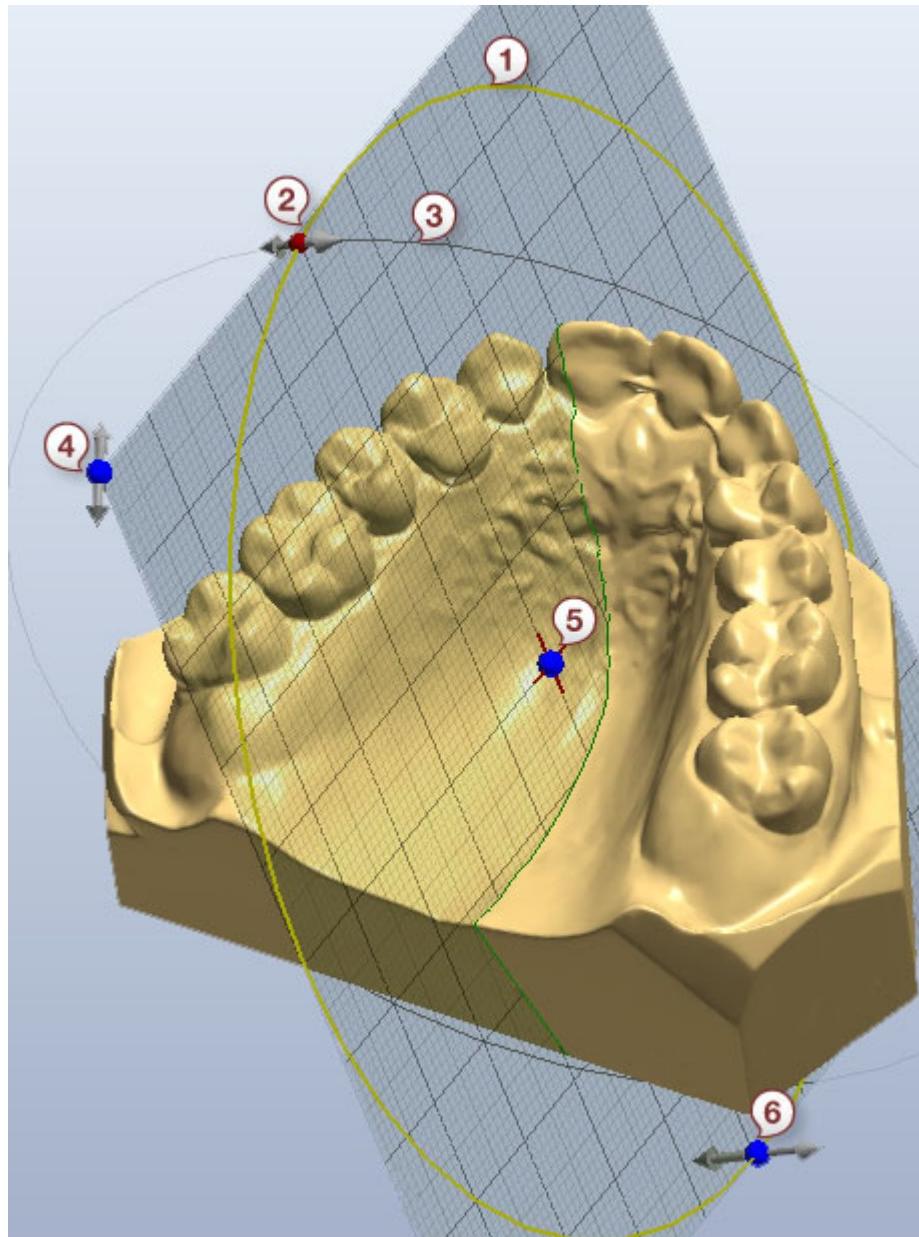
1, 2, 3 – Change the slope of the plane along the cross-section plane which is perpendicular to it. To visualize this additional plane, activate the blue circle by clicking on it to make it turn beige. As long as the beige circle is kept pressed, the system displays the grey circle with its own brown control point. While pressing the mouse button, drag the control point to change the slope of the cross-section plane.

Rotate the plane pressing and dragging the control points on its surface.

4 – The control point located on the plane corner rotates the plane clockwise and anti-clockwise without moving it or changing its slope. Thereby, you can select the most appropriate position of the plane for making on-grid measurements.

5 – Central control point: moves the plane around the model leaving the slope of the plane unchanged.

6 – The control point located on the blue circle defining the plane moves the plane back and forward without changing its slope.



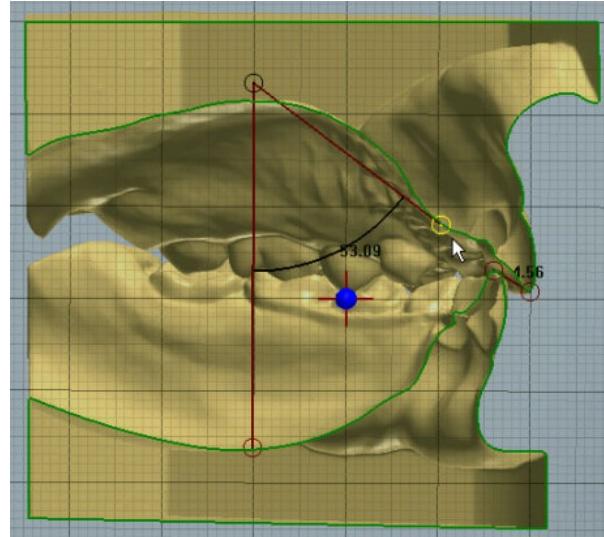
To make on-grid measurements, follow these steps:

- Select either linear or angular mode for the measurement to make.
- Place two (for the linear) or three (for the angular) measurement points directly on the grid to see the values of the taken measurement.

With angle measurement, the second point becomes a vertex of the angle. For instance, the angle between the perpendicular on the hard palate and the alveolar ridge line measured in the shown image equals 53.09°, whereas the overjet measures 4.56 mm.

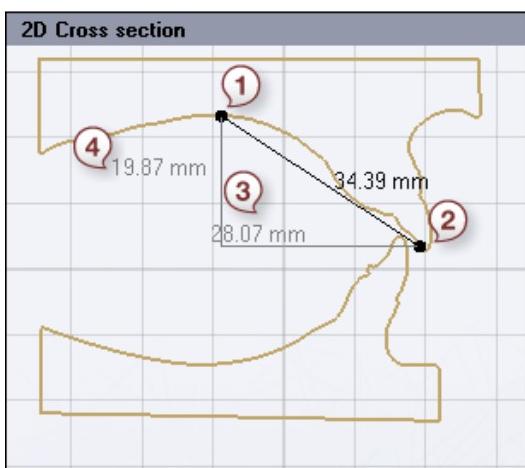
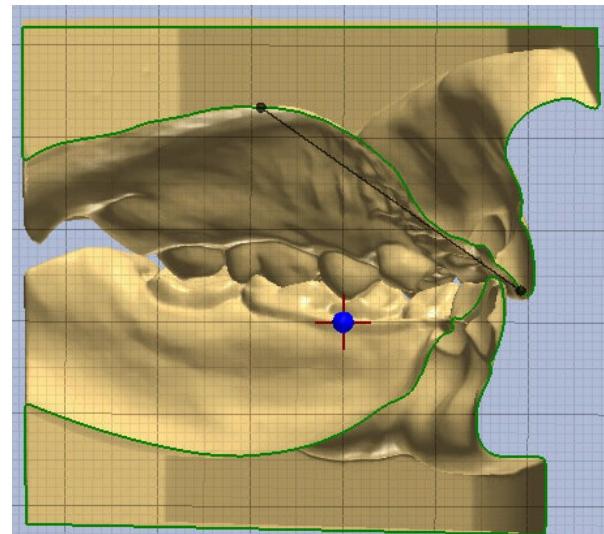
To move the control point, select the point (turns yellow) and drag it to its new position.

- To reset the measurements, move the control points defining them to their proper positions.
- To clear all the measurements made, click the **Clear** button.



The **2D Cross section** window on the right serves not only as the visualization option, but can also assist **linear** and **area** measurements made directly on the schematic image of the cross section.

For better visualization of the position of the measurements, the measurement line is mirrored on the actual model in the session window (see below).



1, 2 – The points placed on the cross-section are automatically attached to the beige contour of the cross-section.

3 – The system automatically builds the right-angled triangle using the selected measurement line as its lateral face.

4 – The measurements of the other faces of this triangle are also displayed on the cross section.

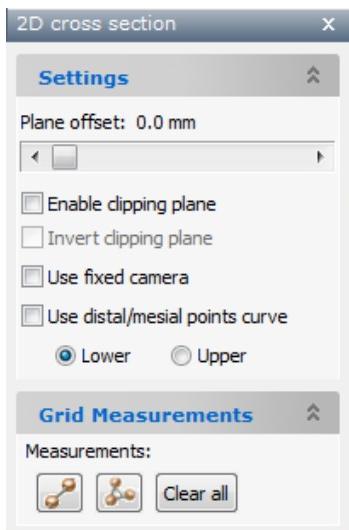
To clear the measurements made, click on **Clear meas.**

The **2D Cross section** window enables area measurements on both sides of the measurement line.

Click the **Area** button and place the cursor over the area you want to measure. The area becomes colored yellow and its value is calculated automatically.



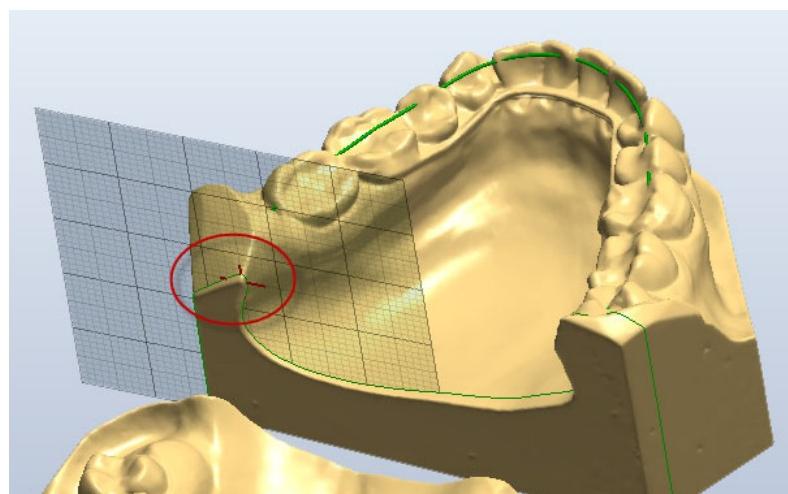
11.3 Cross Section along Dental Arc



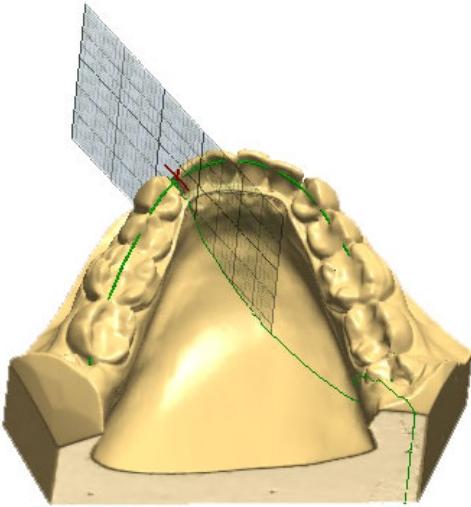
These options of the **2D Cross section** form are similar to the described in the [Cross Section](#) chapter.

The main difference is in the cross-section being positioned along the dental arc with the spline (shown in green) going through its center. The centre of the cross-section plane is marked with a red cross as shown on the image.

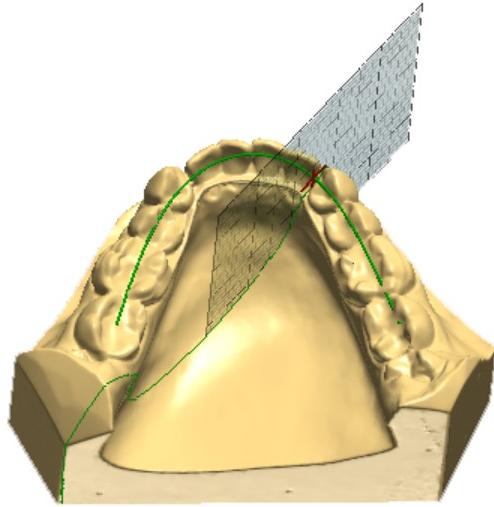
The **Plane offset** scroll bar allows you to move the plane along and perpendicular the spline.



To re-calculate the dental arc spline using the tooth selections made in the **Configuration** tab, mark **Use distal/mesial points curve** checkbox. Compare:



The default shape of the dental arc



The shape corresponds to the distal and mesial settings in the **Configuration** section

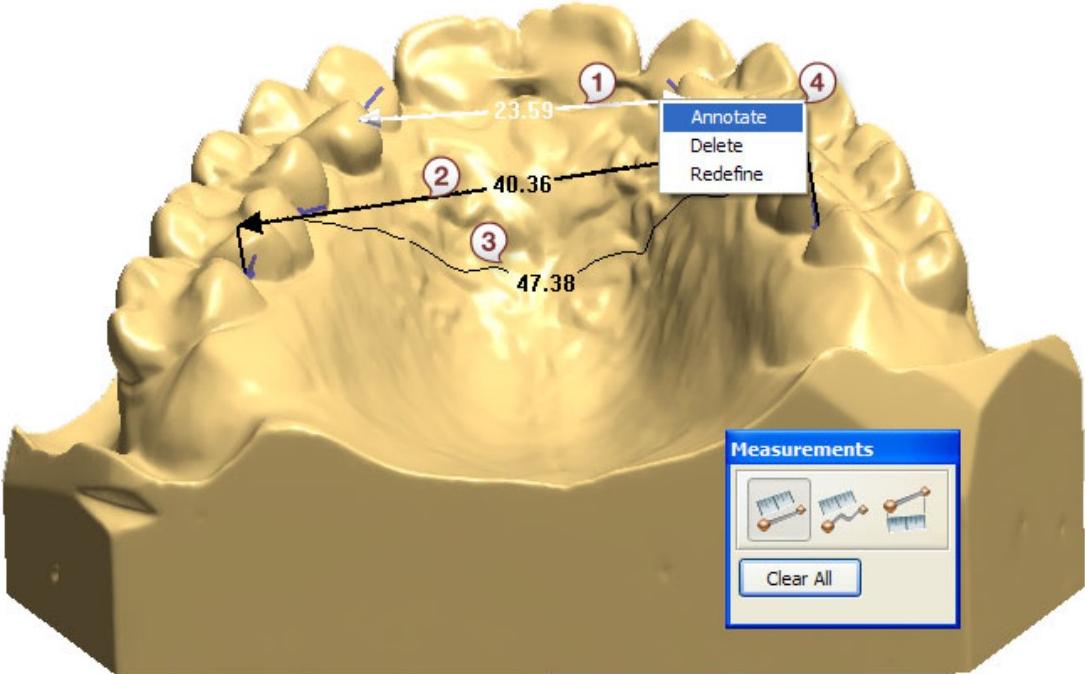
Another visualization option for viewing the cross-section plane is to use a fixed point for visualization. Thereby, it is the model which rotates around the plane when you scroll the **Plane offset** scroll bar, not vice versa. Check **Use fixed camera** to activate this option.

	<p>The default use of the cross-section plane: when you drag the Plane offset scrollbar, the plane is moving along the spline.</p>
	<p>The fixed use of the cross-section plane: when you scroll the Plane offset scrollbar, the virtual cast is moving through the cross section plane.</p>

11.4 3D Distance

The aim of this option is to measure the distance between two points on the model in three different modes: Direct, Surface and Calliper.

Click the **3D distance** button in the **Inspection** tab, a dialog box appears where you can select the appropriate mode for 3D measurement. Use the image below to differentiate between the following three measurement modes for the 3D distance:



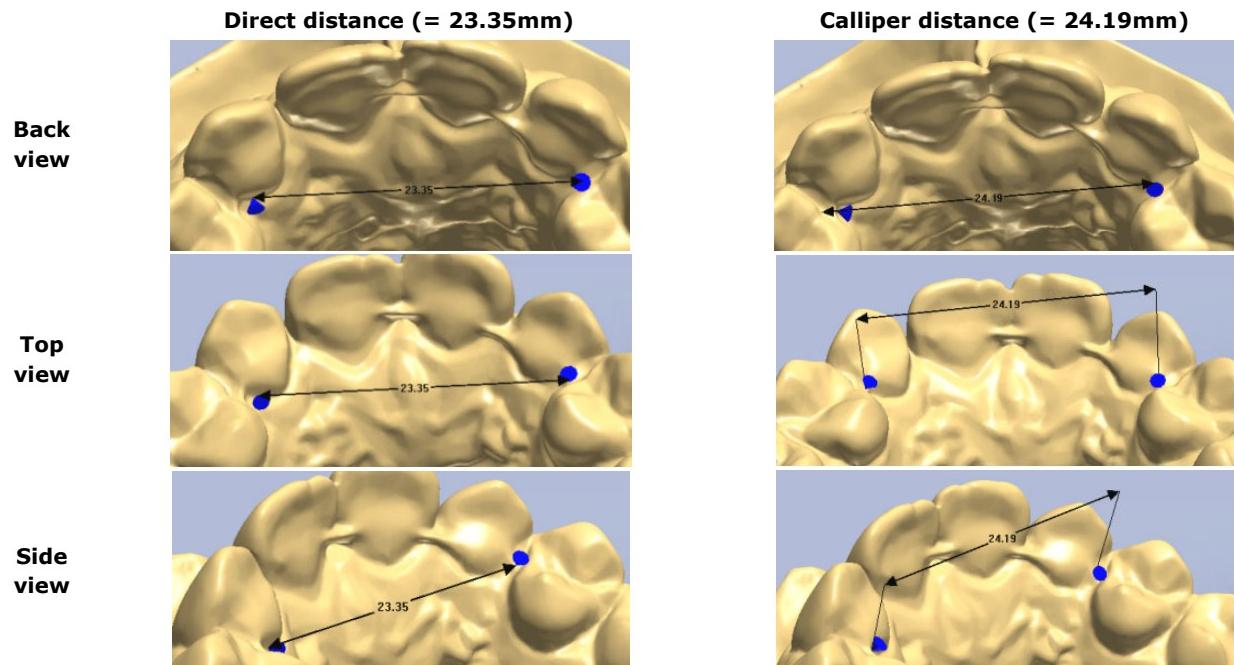
1 – Direct mode equals to a plain straight 2D measurement from point A to point B.

2 - Surface mode enables a 3D measurement of the distance following the surface of the model.

3 – Caliper mode assists in making 3D measurements using traditional 2D techniques while looking at the model from the top. You need to indicate two markers to measure the 3D distance between them (not the plain 2D distance!). To take standard 3D caliper measurements, select the **Top view** from the Visualization toolbar.

When you want to **Annotate**, **Delete** or **Redefine** your 3D measurements, right-click the desired measurement and select the required option from the appeared menu.

Changing the point-of-view allows you to see the difference between the direct and caliper measurements:



The measurements are saved as analysis objects (see [Analysis Objects](#)).

The surface marker location can be changed by dragging it to a different location. **Clear all** button removes all the measurements.

12 Model Set Comparison

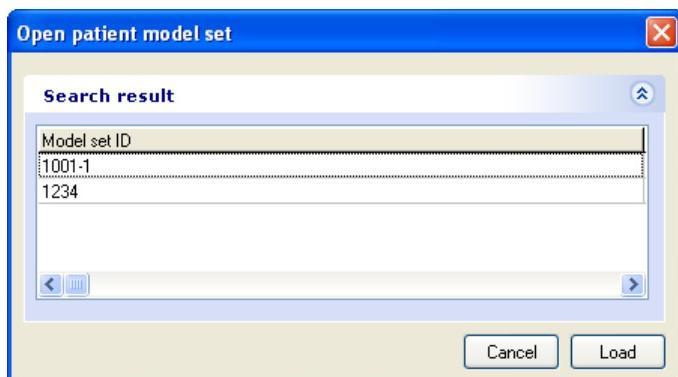


The **Model Set Compare** section of the Function panel enables detailed simultaneous analysis of the two model sets belonging to one patient.

This section includes: **Compare model sets**, **Maxillary model registration**, **Mandibular model registration** and **Difference map for two model sets**. These steps are described in details below.

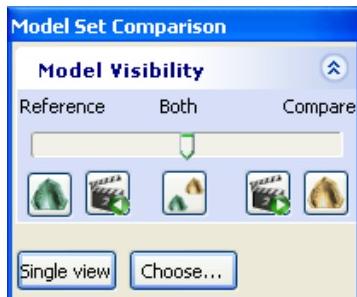
12.1 Compare Model Sets

To activate this option, click the **Compare model sets** button in the Main toolbar while one of the patient models is already loaded.



This will open the Open patient model set window with the model sets listed in the search results for the chosen patient. Select the model set you wish to compare the already loaded one to and click the **Load** button.

This loads the second model set. The two model sets are displayed in the same position but with different colors.

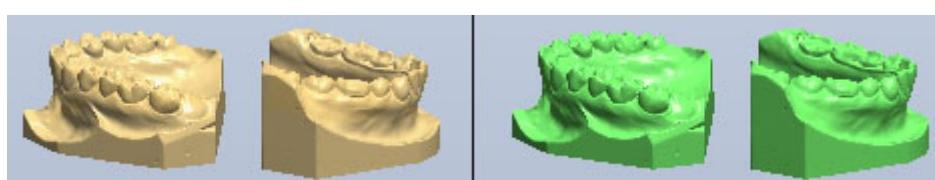


The visibility of the models can be operated from the appeared *Model Set Comparison* window.

The reference model has green and the compare model has yellow colors. The model visibility (color) can be gradually changed with the slider or toggled with the **Show reference model set only** and **Show compare model set only** buttons.

The **Show both model sets** button returns the slider to the middle position.

The **Animate to reference model sets** and **Animate to compare model sets** buttons slowly move the sliding bar from one end to the other in the corresponding animation.

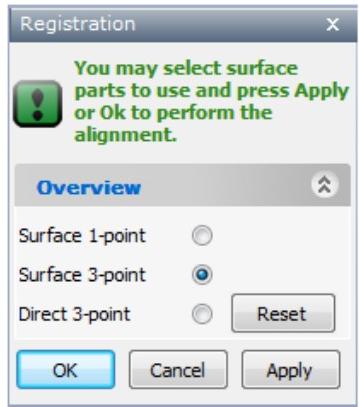


When clicked, the **Single view** button changes to the **Dual view** one and displays two model sets next to each other.

The **Choose** button opens *Open patient model set* window to load another model to compare with if needed.

12.2 Maxillary Model Registration

The aim of the **Maxillary model registration** step is to properly align the upper models of the model sets chosen for comparison. This is a necessary pre-requisite for effective and informative analysis of differences between the model sets.



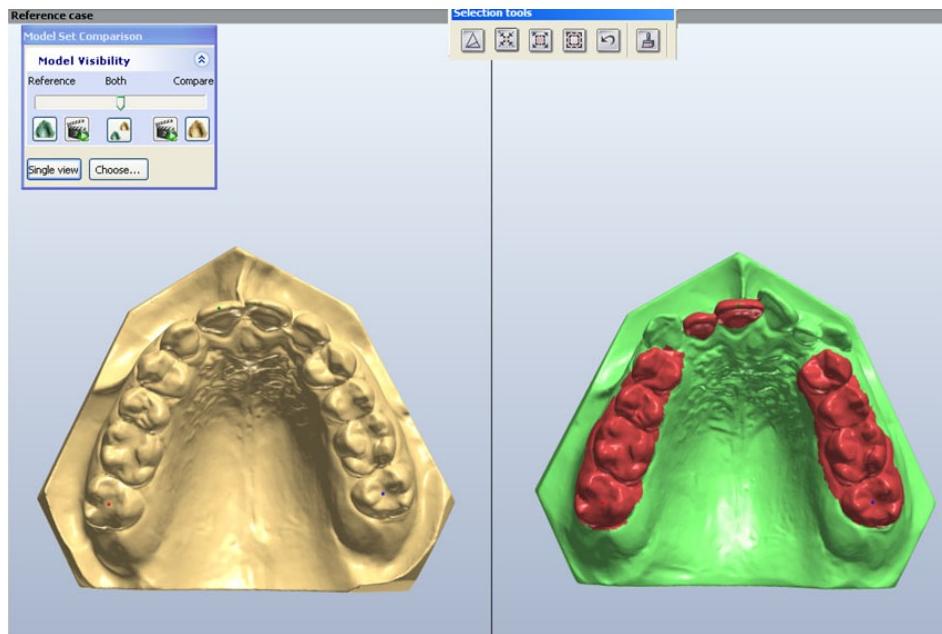
Click the  **Maxillary model registration** button in the **Model Set Compare** tab.

Choose the best option for the model alignment in the appeared **Registration** form:

- **Surface 1-point:** Indicate single corresponding points on each model for alignment and optionally select the surface to align with the help of the **Selection Tools**.
- **Surface 3-point:** Indicate three corresponding points on each model for alignment and optionally select the surface to align using the **Selection Tools**.
- **Direct 3-point:** Indicate three corresponding points on each model for alignment. This method does not use the surface information.



NOTE: It is advisable to use the **Dual view** visualization in order to access both models at the same time. The selection of points can be done on the reference model first and then on the comparative model, or vice versa. Use the **Reset** button to delete the reference points if needed.



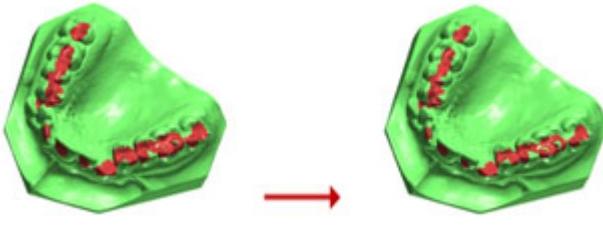
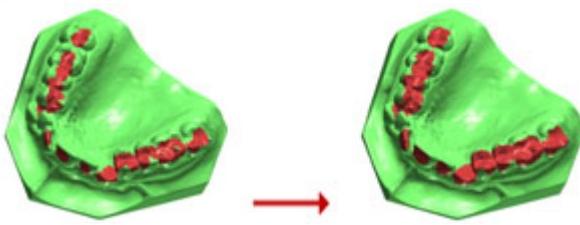
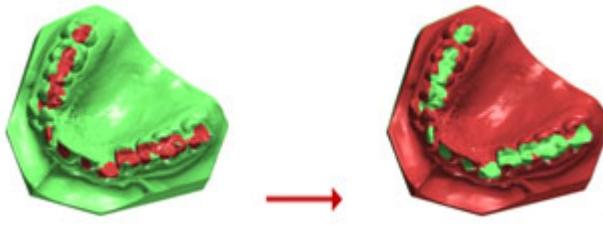
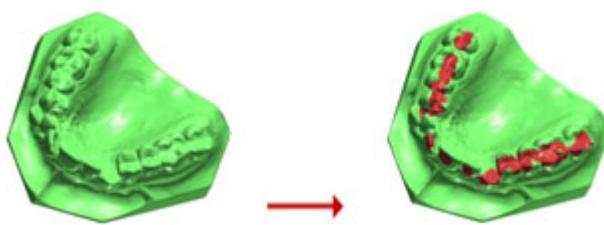
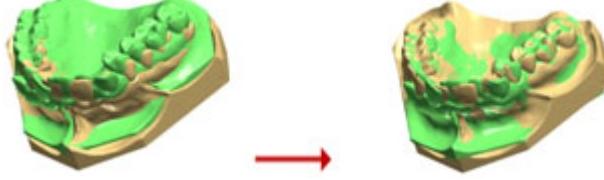
The additional surface information provided with the **Selection tools** improves the alignment process. When no surface correspondences are set, the system automatically uses the whole surfaces of the models as the reference surfaces.

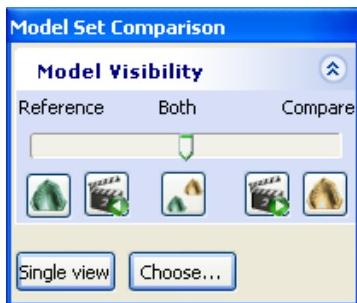
These tools are only available in **Surface 1-point** and the **Surface 3-point** registration methods as the **Direct 3-point** method does not refer to surfaces.



The selection tools can be used in any order and combination.

The tools include the following:

Item	Action
	Unselect all – Unselects all selections.
	Reduce selection – Reduces the selected area by excluding the neighboring areas from the selection. 
	Extend selection – Extends the selected area by adding the neighboring areas to the current selection. 
	Invert selection – Unselects the selected and selects unselected areas of the surface. 
	Undo last selection – Makes one step back in the selection operation.
	Paint selection – Use the brush tool to “paint” the model reference surface while keeping the left mouse button pressed. 
Result	



To see the effects produced by the selections of the upper model registration, keep pressing **Apply** and transfer to the **Single view**.

The *Model Set Compare* form (image to the left) is described in the [Compare Model Sets](#) chapter.

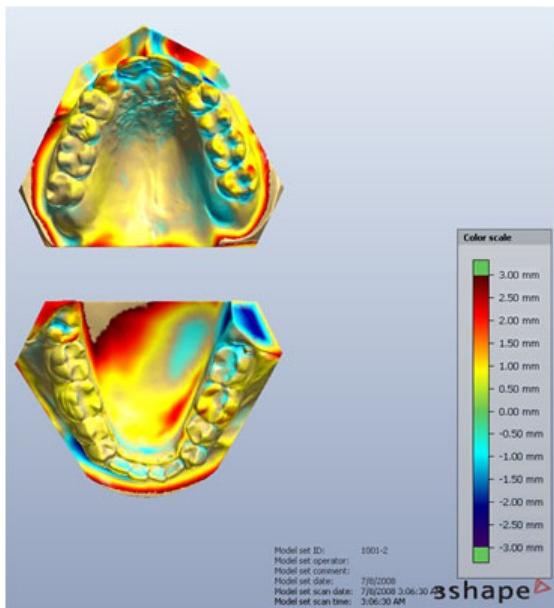
On completion of the upper model registration, click **OK** to save the results and leave the step.

12.3 Mandibular Model Registration

This step assists the proper alignment of the lower models belonging to the model sets chosen for comparison. This is a necessary pre-requisite for effective and informative analysis of the differences between the model sets.

Click the  **Mandibular model registration** button in the **Model Set Compare** tab to open the **Registration** form. The rest of the registration process is similar to the one described in [Maxillary Model Registration](#) chapter.

12.4 Difference Map for Two Model Sets



The **Difference map for two model sets** compares shape differences between the reference and the examined model sets visualized with the help of the color scale. The distance between the surfaces of the two model sets is measured yielding positive and negative deviation values.



Click the  **Difference map for two model sets** button in the **Model Set Compare** tab. The system will automatically mark the virtual casts according to the Color scale displayed on the right of the session window

The areas of the model set rising above the reference model are marked red gradually transiting to green, as the distance between the models gets smaller, and then continues to the colder color palette, when the surfaces of the compared model sets start to intersect.

13 Saving Results

13.1 Save Session

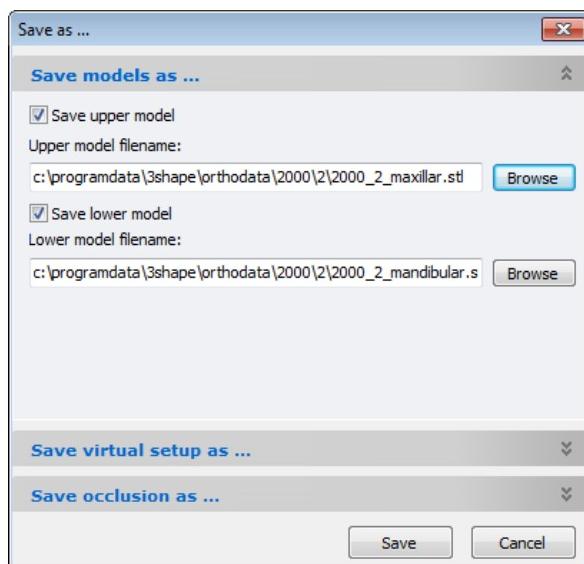
While working with on a model set, you can always save your current session by pressing the  **Save session** function button and save the current feature tree in .3ml format in the default 'OrthoData' folder.

13.2 Save Models as...

With the  **Save models as...** button you can save your upper/lower models to the specified folders with the chosen names.

Save virtual setup as... section saves the simulation you have made for the orthodontic treatment.

Save occlusion as... section saves the name of the new occlusion.



14 Creating Virtual Base

Creating the virtual base involves a modeling session to align maxillary and mandibular models. The first step depends on a chosen **Create Virtual Base** or **Open Patient Model Set in Virtual Base** modeling mode. The first option opens any baseless model set for modeling, whereas, in the second one opens the baseless model set within the patient database.

14.1 Create Virtual Base

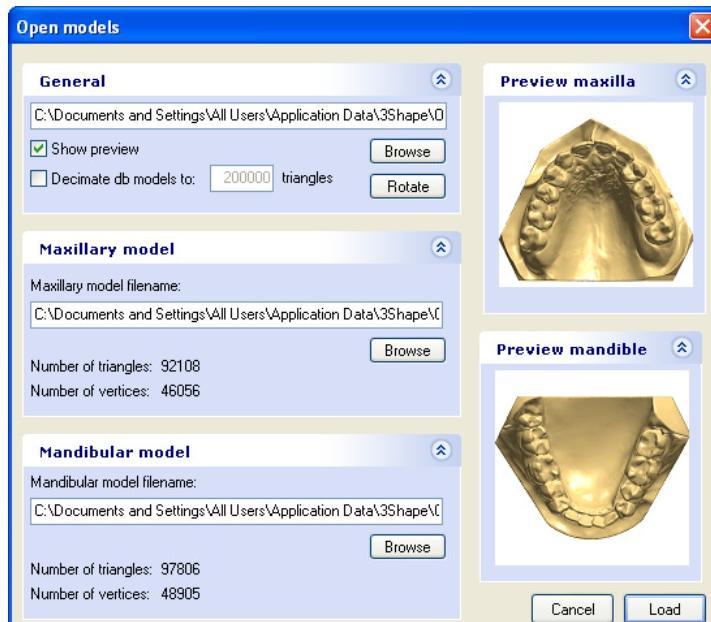
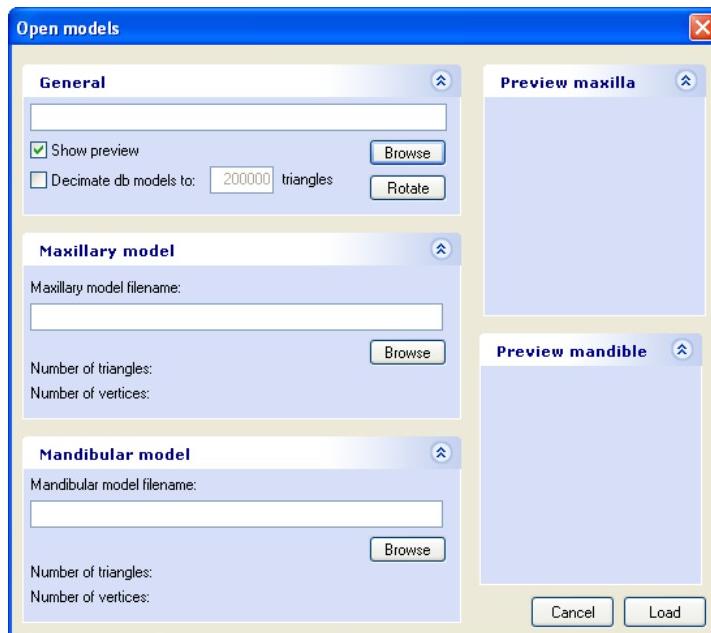


This functionality creates virtual base for a model or a model set not necessarily belonging to the patient database.

The task is executed in three steps: **Open models**, **Virtual base** and **Export models as**.

- **Open Models**

Click the **Create Virtual Base** button to automatically go to the *Open models* window and load the required models with the **Load** button.



-  **Virtual Base**



The software automatically opens the **Virtual base** dialog guiding you through the main steps: **Default Cut** or **Define Cut, Fit Base**, **Create Base**, and **Reset**.



Upper/Lower base icons toggle the visualization of the corresponding models for better overview.



Previous /Next operations navigation buttons.



Default cut – makes the default cut.

Define cut – used to draw the cut or edit the created default cut.

Fit base – adjusts the base.

Create base - creates a new base.

Base model type

Select the desired base model type from the drop-down menus. (The virtual models are set up in the *Feature Settings->Template base models* of the Ortho Control Panel

Default cut

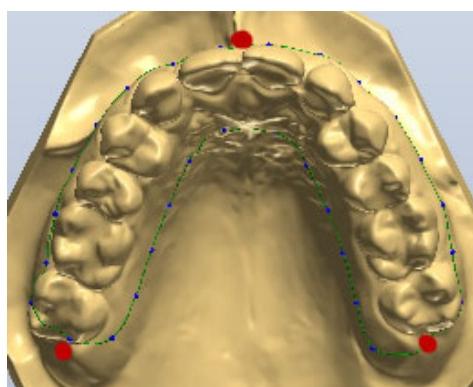
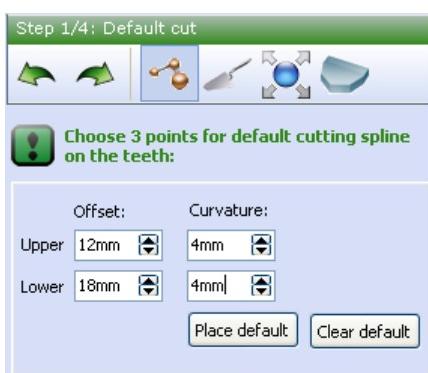
You have the option of quickly positioning the default base cut or defining it yourself at the **Define cut** step.

To place the default cut, click the **Place default** button and then adjust the positions of the cutting splines with the **Offset** and **Curvature** values shown on the image below (left).

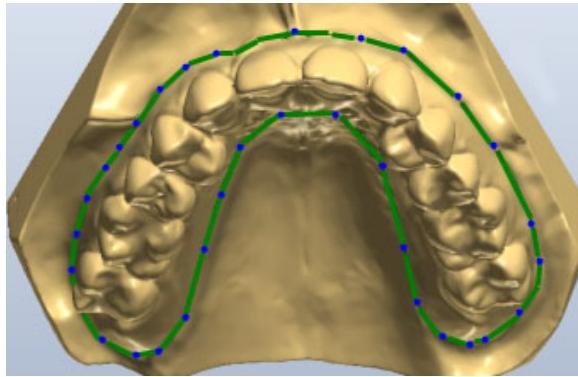
For a more accurate placement of the cutting splines select 3 points on each jaw as shown on the image (right) and then click the **Place default** button.

Incorrect splines can be removed with the **Clear default** button.

You can then go to the **Fit base** step or opt to adjust the cutting splines manually first at the **Define cut** step.



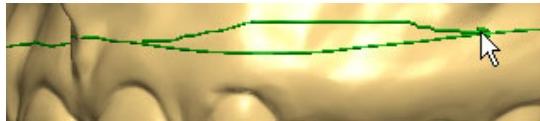
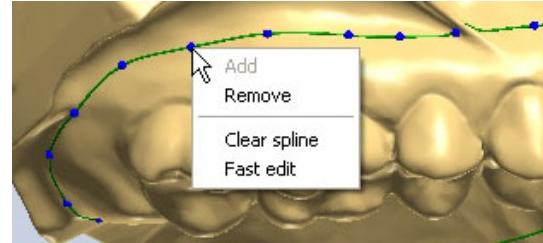
Define cut



Decide on the part of the model you wish to leave, click the **Define cut** button if not already at this step and place the spline points over the model curve to define the cut. Click the first point of the spline to close it. Where needed, adjust the spline manually by dragging the points with the cursor to the required position.

Incorrect splines can be removed by clicking the corresponding **Clear splines** buttons in the *Virtual base* dialog.

From the right-click menu options of the cursor positioned over the cutting spline you can **Add** new or **Remove** indicated spline points, **Clear spline** or use **Fast edit** function to correct the spline

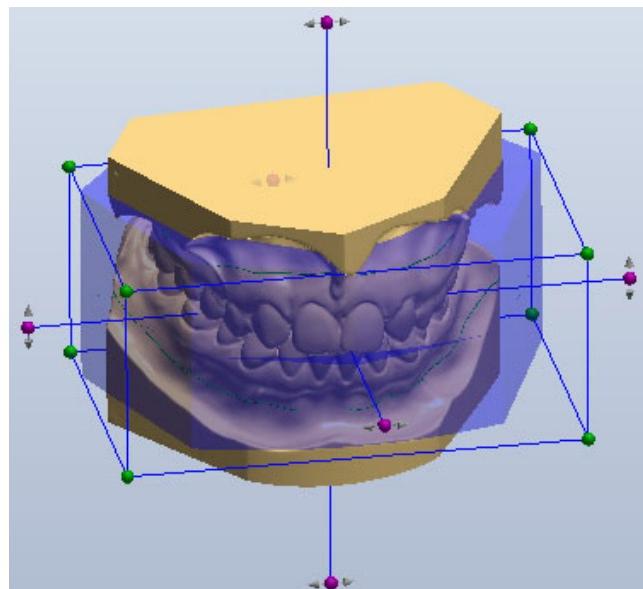


For **Fast edit**, left-click on the spline and move the cursor while holding the mouse button down to draw a new part of the spline.

Fit base

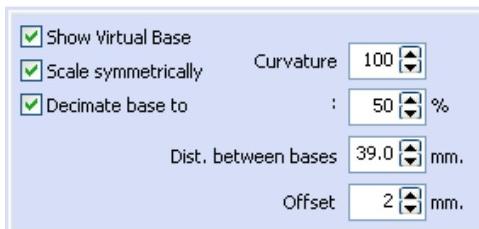
Once maxilla and mandible splines have been placed, click the **Next** or the **Fit base** buttons to go to the **Fit base** step.

You can adjust orientation of the base by dragging the violet points and the base size with the green points of the bounding box. Click and hold the mouse button to drag the bounding box to the required position.



The following parameters of the base can be modified:

Show Virtual Base – toggles visualization of the virtual base.



Scale Symmetrically – sets whether the bounding box is scaled symmetrically when dragging by the green points.

Decimate base to - specifies the decimation amount of the base triangles (see image below).

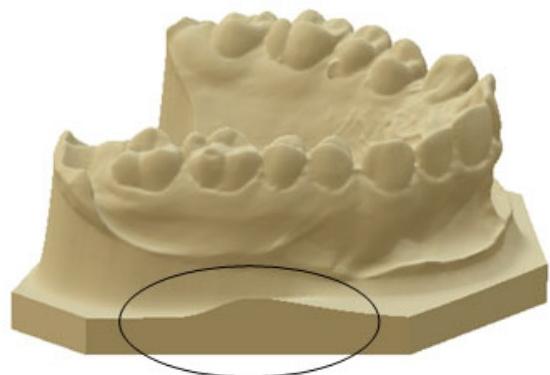
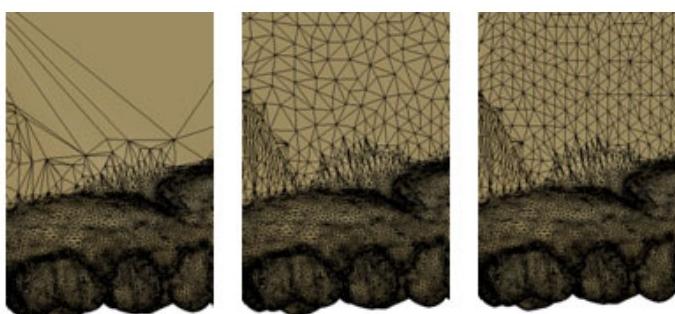
Curvature - sets the amount of curvedness for the base model along the sides (see image below).

Dist. between bases - Specifies the distance between the maxillary and the mandibular bases.

Offset - specifies the distance between the initial shapes of the base and the baseless model.

Decimation by 5%, 50% and 80% respectively.

Curvature sets the amount of curvedness for the base model along the sides.

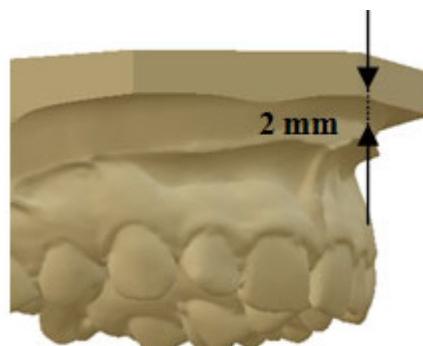
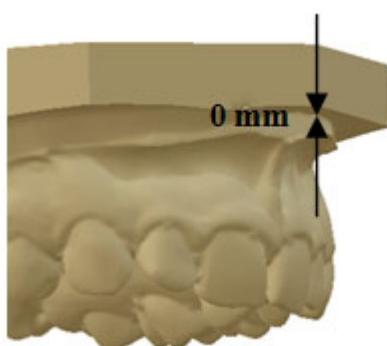


Create base



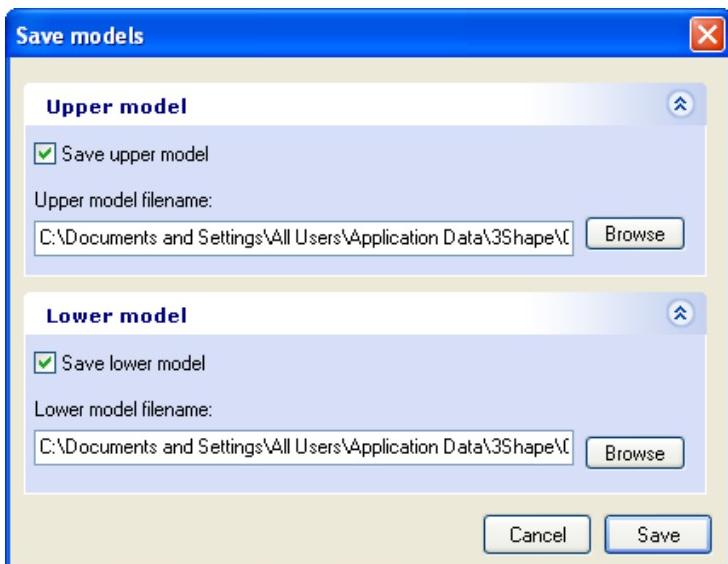
Once adjustments to the bounding box at the **Fit base** step are complete, click the **Next** or **Create base** button to create the virtual base.

Click **OK** to close the *Virtual base* dialog window. Your models now appear to have virtual bases.



Base offset 0mm and 2mm respectively

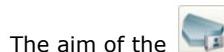
-  **Export models as...**



Once creation of the virtual base is finished, it is necessary to save the models.

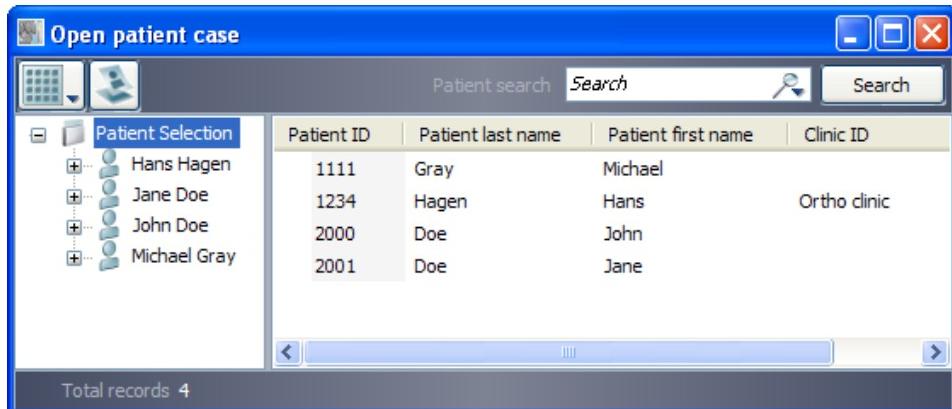
 Click the **Export models as...** button and select the checkboxes to save either both or only Upper/Lower model in the appeared *Save models* dialog, browse to the desired location and click the **Save** button.

14.2 Open Patient Model Set in Virtual Base



The aim of the **Open Patient Model Set in Virtual Base** step is to model the virtual base for a model or a model set belonging to the patient database. The task involves completing of the three steps:

Open Models, Virtual Base and **Export Models**, similarly to the described in the **Create Virtual Base** chapter with the only difference being the automatic navigation to the *Open patient case* dialog where the user looks for a model set within the available patient cases.



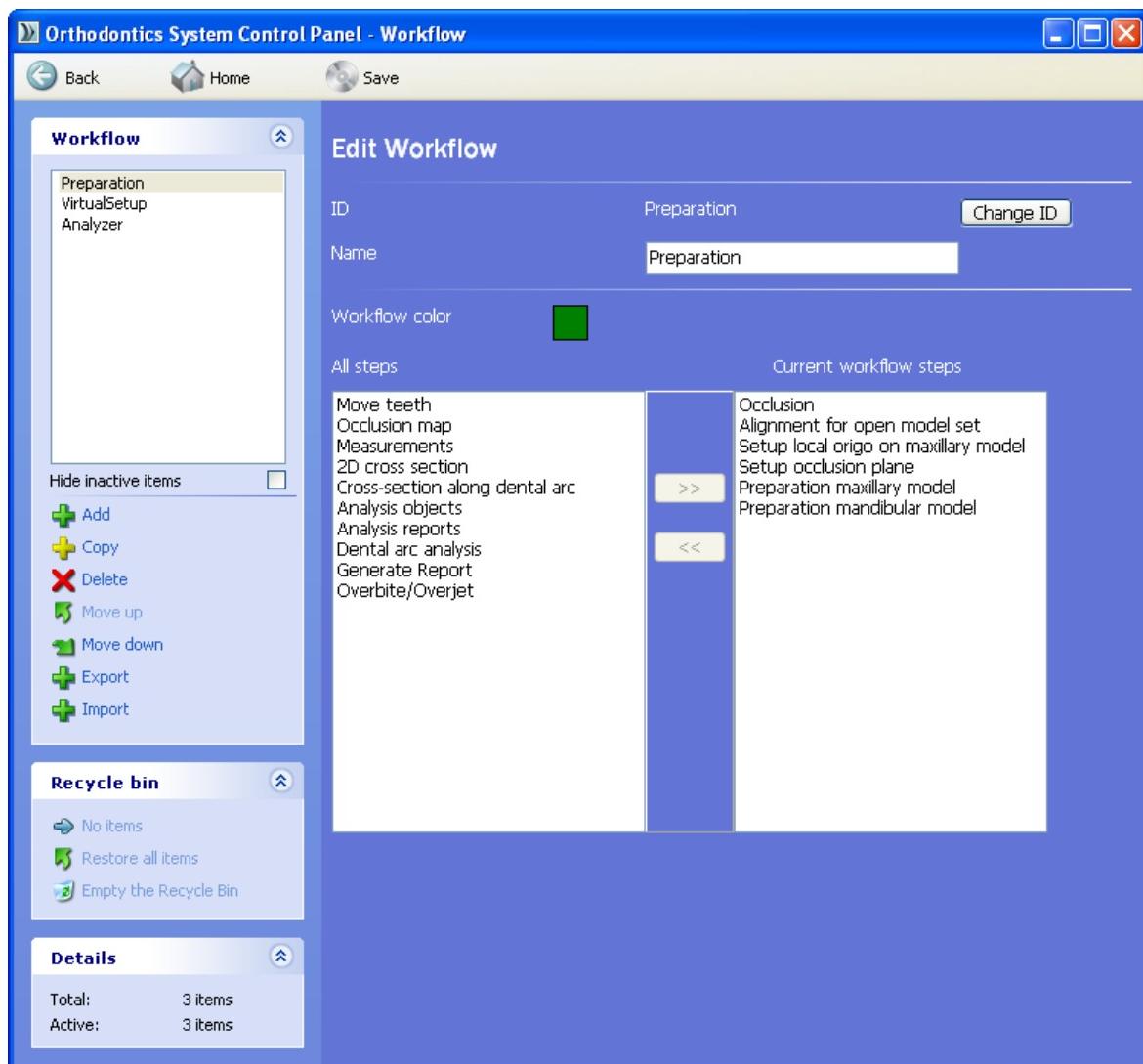
15 Customized Workflow Wizard

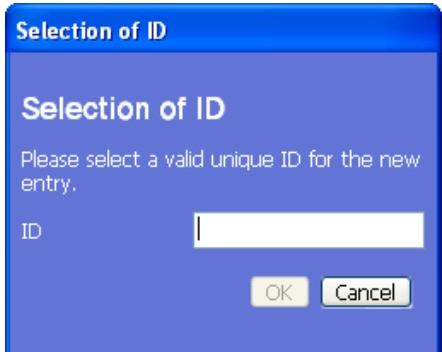
As a new feature in OrthoAnalyzer 2010, you can create a number of customized workflow wizards with predefined operational steps. This cleans up the software interface and organizes steps and operations for your own use. The supplied OrthoAnalyzer version installs 3 pre-made customized workflow wizards by default. As shown on the image, the wizards are represented by the hat icons of varying color and are located in the toolbar of the OrthoAnalyzer.

The supplied wizards are named as follows:



The wizards are setup and edited in the Ortho Control Panel. You can use and edit the pre-made wizards or add your new wizards. In order to setup or edit the wizard, open Workflow Settings of the Ortho Control Panel. The following image shows 3 pre-made wizards set up in the Ortho Control Panel.





• Adding a new wizard

When creating a new wizard, click the **Add** button to add the wizard ID in the appeared *Selection of ID* window.

Once the new wizard is added it appears in the *Workflow* list on the left. Inactive wizards can be hidden from the list by selecting the required wizard and ticking the *Hide inactive items* checkbox.

All available steps of a wizard are shown under *All steps* listing while the wizard remains selected.

Select the required steps for the created wizard and transfer them to the *Current workflow steps* list on the right with the **>>** button.

Use the **<<** button to remove the selected steps from the *Current workflow steps* list if needed.

The customized workflow wizard name can be edited by selecting it from the *Workflow* list and clicking the **Change ID** button.

You can specify color of the selected wizard by clicking the *Workflow color* cube and selecting the desired color from the available palette.

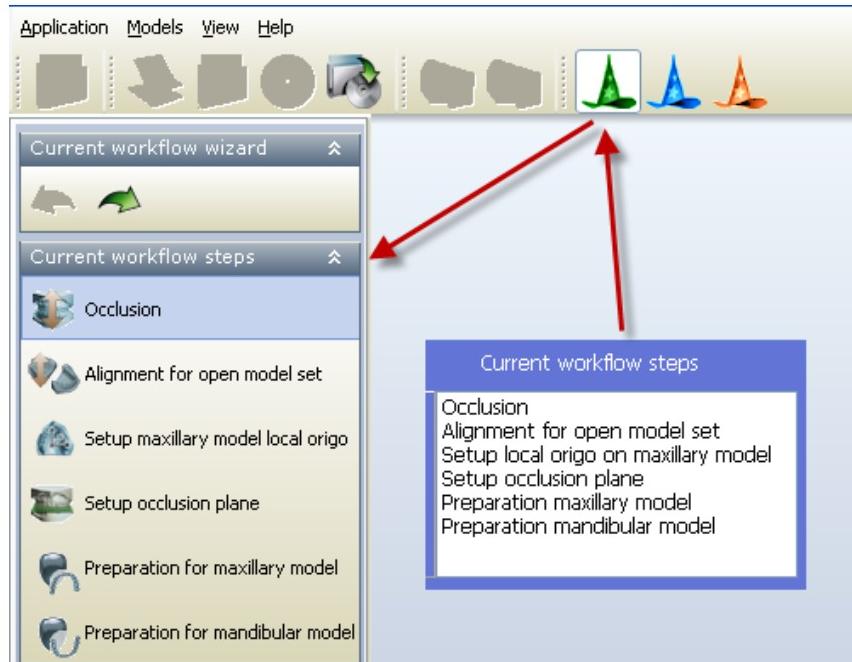
• Other operations

With the other operations you can **Copy**, **Delete**, **Move up** and **Move down** the selected wizards. The deleted wizards are kept in the Recycle bin. You can either restore them or empty the Recycle bin.

The **Export** and **Import** buttons allow you to easily export or import your wizard settings to/from a *.3ml file.

Click the **Save** button at the top of the window to save your changes in the Ortho Control Panel.

Only the sequence of steps defined for the wizard in the Ortho Control Panel appears in the OrthoAnalyzer interface on the wizard icon selection. The following image shows the operational steps of the default **Preparation** wizard in the Ortho Control Panel and OrthoAnalyzer interface.



ControlPanel

3Shape Ortho Control Panel™ is the primary control tool for 3Shape's ScanItOrthodontics™ and OrthoAnalyzer™ that allows you to view and manipulate various basic system settings and controls, such as specifying data folders, orthodontics indexing, analysis and licensing systems and the relevant construction elements.

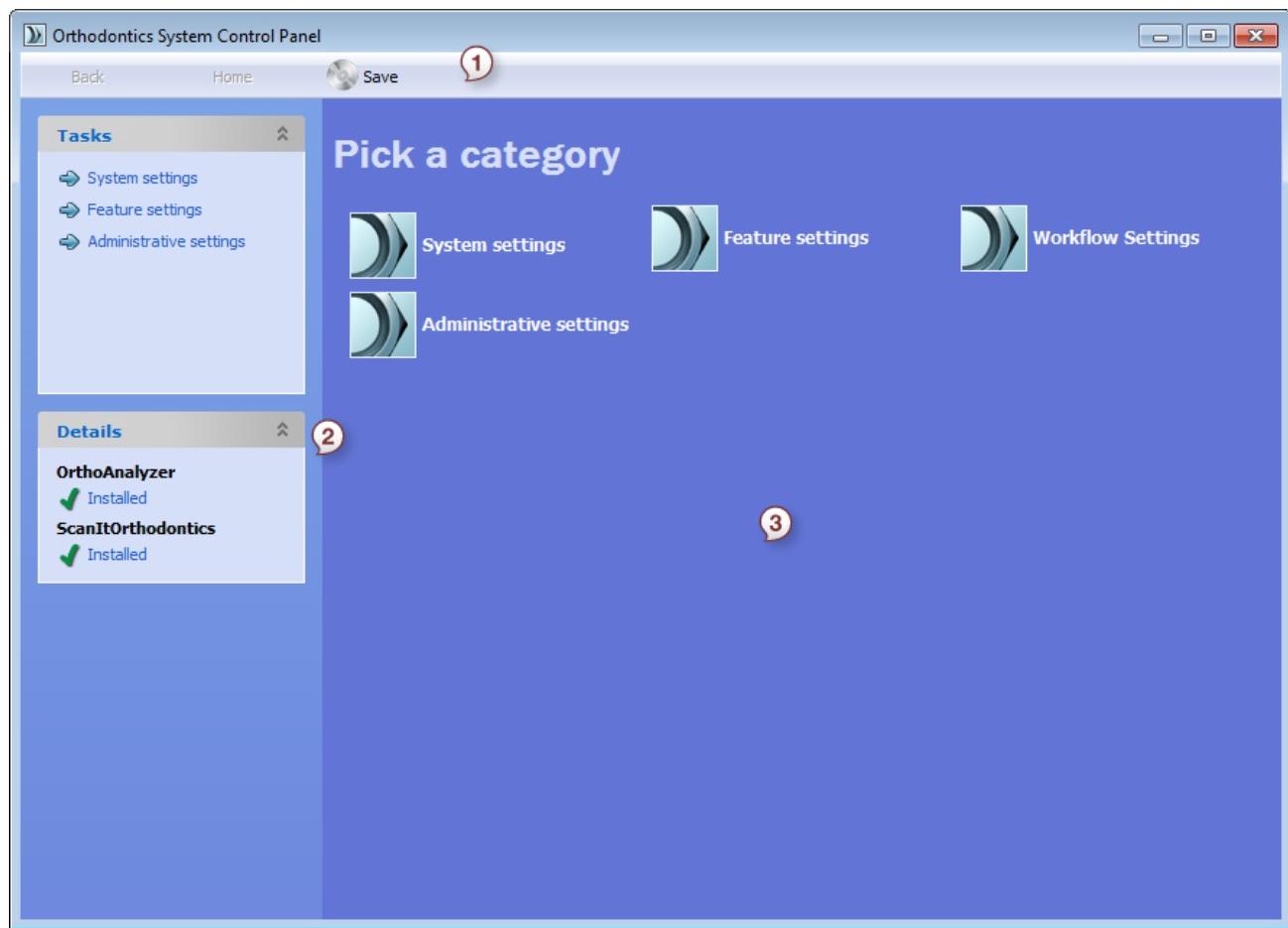
This manual introduces the Ortho Control Panel™ application and traces its connections to the 3Shape orthodontics software.

16 The OCP User Interface

Ortho Control Panel employs a Microsoft Windows™-based graphical user interface that allows you to view the settings modifications on screen while they are being made.

Ortho Control Panel is started by double-clicking the Ortho Control Panel desktop icon  or via the Windows™ Start menu: *Start → All Programs → 3Shape → 3Shape Ortho Control Panel*. When the application is started, there appears a main window of the program displayed on the image below. It consists of:

1. The Control toolbar
2. The Status toolbar
3. The Main window



A detailed description of the toolbars is provided in sections below.

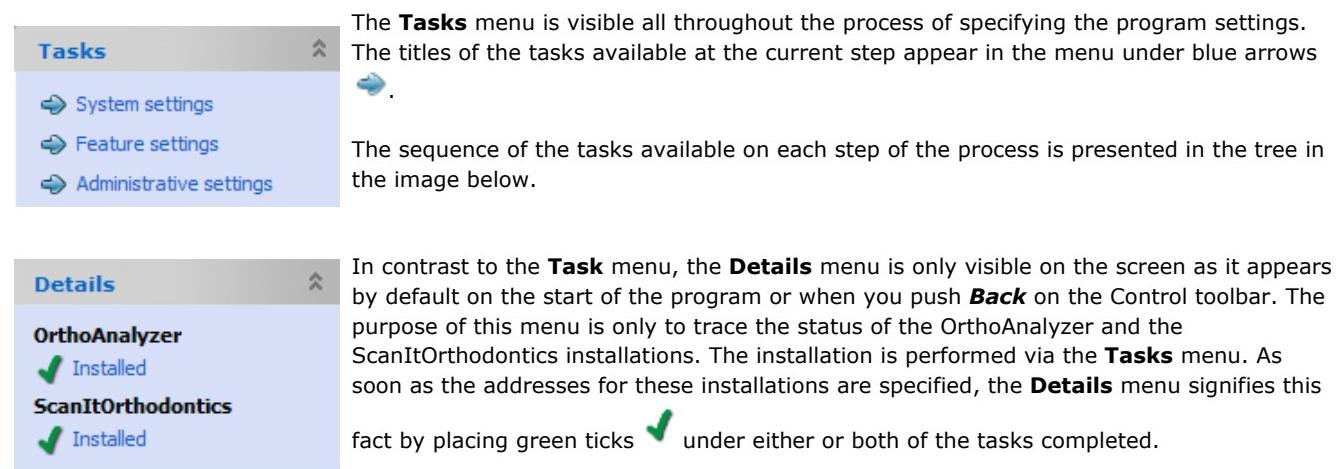
16.1 The Control Toolbar

The Control toolbar contains three basic control functions that are used for moving around the application and saving the modifications made to the system:

 Back	Takes you back to the previous step
 Home	Takes you to the default page
 Save	Saves the current changes made to the application settings

16.2 The Status Toolbar

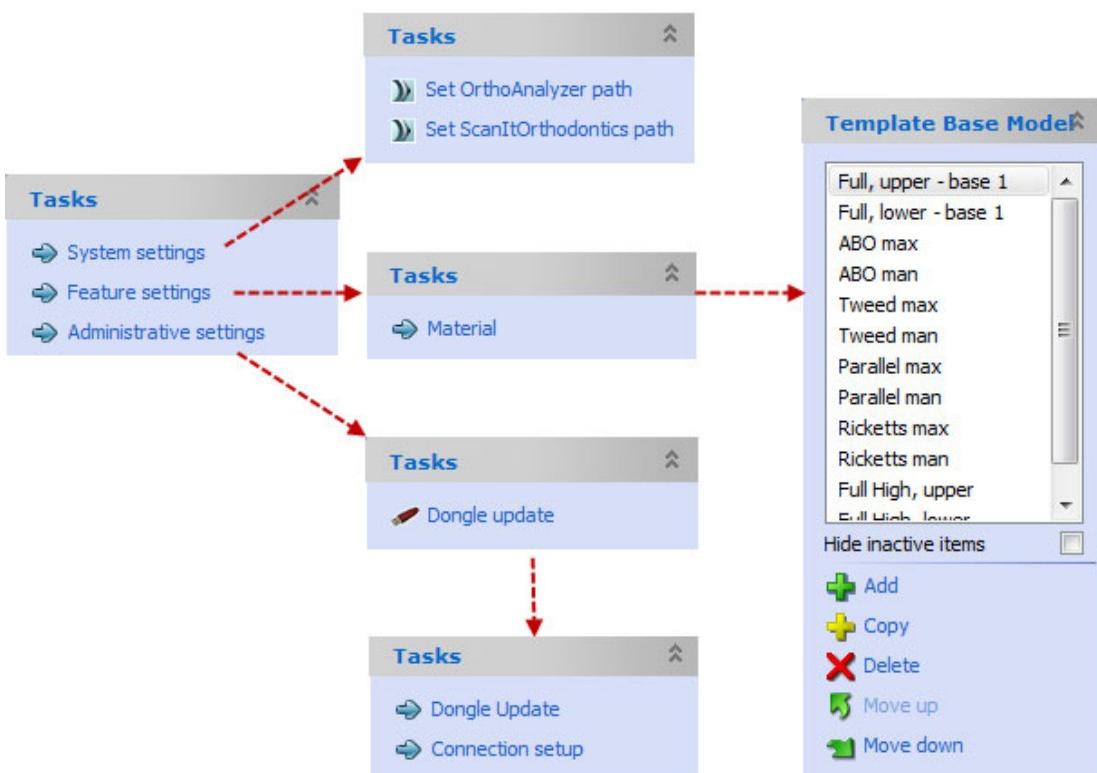
The Status toolbar is designed to guide you through the main steps of defining the program settings for OrthoAnalyzer. It is comprised of the two menus: **Tasks** and **Details**.



The **Tasks** menu is visible all throughout the process of specifying the program settings. The titles of the tasks available at the current step appear in the menu under blue arrows .

The sequence of the tasks available on each step of the process is presented in the tree in the image below.

In contrast to the **Task** menu, the **Details** menu is only visible on the screen as it appears by default on the start of the program or when you push **Back** on the Control toolbar. The purpose of this menu is only to trace the status of the OrthoAnalyzer and the ScanItOrthodontics installations. The installation is performed via the **Tasks** menu. As soon as the addresses for these installations are specified, the **Details** menu signifies this fact by placing green ticks under either or both of the tasks completed.



17 Executing the Program

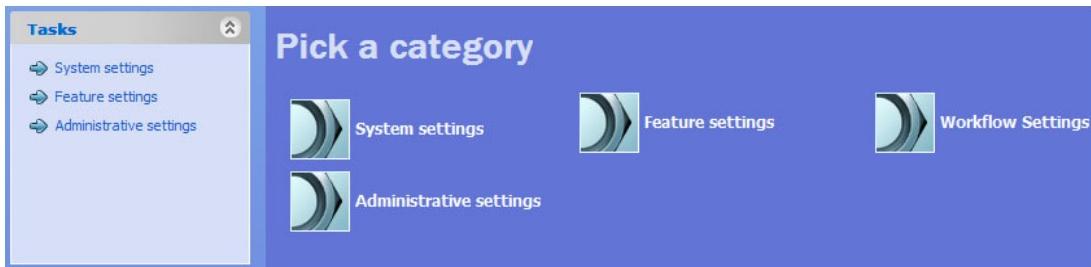
3Shape Ortho Control Panel is started by double-clicking the Ortho Control Panel desktop icon  or via the Windows™ Start menu: *Start → All Programs → 3Shape → 3Shape Ortho Control Panel*. When the application is started, there appears the screen described and illustrated in the previous chapter [The Ortho Control Panel User Interface](#).

At this stage, there are four options available for you as a starting point:

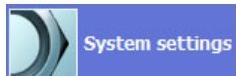
- **System settings**
- **Feature settings**
- **Workflow settings**
- **Administrative settings**

Three of these options are also displayed in the **Tasks** menu (the **System**, the **Feature** and the **Administrative** settings).

To continue, press either of the icons in the Main window or press on the tasks displayed in the Status toolbar.



17.1 System Settings



As soon as you click the **System Settings** icon, the main window opens up displaying five tabs with different system settings available for editing. You will have to scroll down to view all of them:

- **OrthoAnalyzer**
- **ScanItOrthodontics**
- **Data folder**
- **Miscellaneous**
- **Dongle license server**

The **Tasks** menu displays the two main tasks currently available for completion:

- **Set OrthoAnalyzer path**
- **Set ScanItOrthodontics path**

Follow the hints provided in the following chapters to complete these tasks.

17.1.1 OrthoAnalyzer

View the **OrthoAnalyzer** tab of the *System Settings* window identifying the path for the OrthoAnalyzer application in it (see image below).

Click **Set OrthoAnalyzer path** on the **Tasks** menu or click the **Browse** button to identify the path. Set the OrthoAnalyzer path in the *Browse for folder* window that appeared. The default path would be *C:\Program Files\3Shape\OrthoAnalyzer*.

The formats available for saving your models are:

STL: Standard open format.

DCM: 3Shape compressed format. Gives smaller files, but not supported by external software.

PTS: Only the raw scan points are saved. However, the points will still be processed (temporarily) in order to allow alignment.

PTS Cyra: Special point cloud format (for very special cases only).

VRML: Is an alternative format for saving models. It is primarily used for saving face scan models in 3Shape software.

Select the **Force creating models preview** checkbox to allow generating of the model's preview while creating the model in OrthoAnalyzer.

Select the **Cases compare auto-alignment** checkbox to allow the **Model set compare** function in OrthoAnalyzer to automatically run an alignment algorithm on the two models when starting the function.

Define templates for Patient and ModelSet ID generation in the corresponding fields (see image below). Customize the number and succession of the templates as desired by selecting them from the drop-down menus. Select **Unspecified** to leave the template empty.

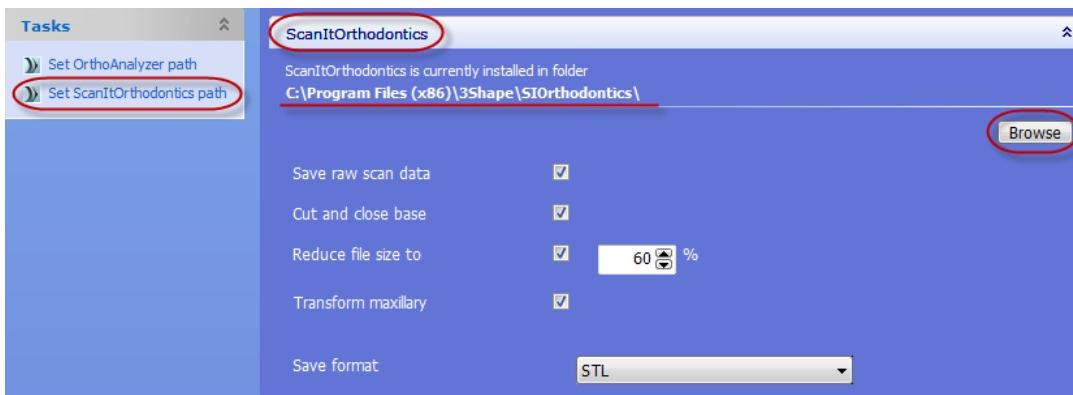
To generate the IDs automatically, select the **Automatic Patient** or **ModelSet ID generation** checkboxes.



17.1.2 ScanItOrthodontics

View the **ScanItOrthodontics** tab of the *System Settings* window identifying the path for the ScanItOrthodontics application in it (see image below).

Click **Set ScanItOrthodontics path** on the **Tasks** menu or click the **Browse** button to identify the path. Set the ScanItOrthodontics path in the *Browse for folder* window that appeared. The default path would be *C:\Program Files\3Shape\SIOrthodontics*.



Check the **Save raw scan data** checkbox to save the intermediate results as raw (point cloud) data. This allows you to get back to the scanning process without having the scan.

Check the **Cut and close base** checkbox to cut the base and align its contours automatically.

Check the **Reduce file size** to checkbox and define the extent of decimation (%) to visualize the scan decimation along the way.

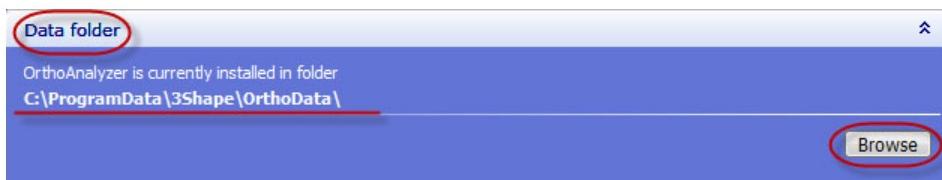
Transform maxillary – transforms the upper model if only the maxillary model is scanned.

Select the appropriate **Save format** for the scan: **STL, DCM, PTS, PTSCyra** or **VRML** (see chapter [OrthoAnalyzer](#) for details).

17.1.3 Data Folder

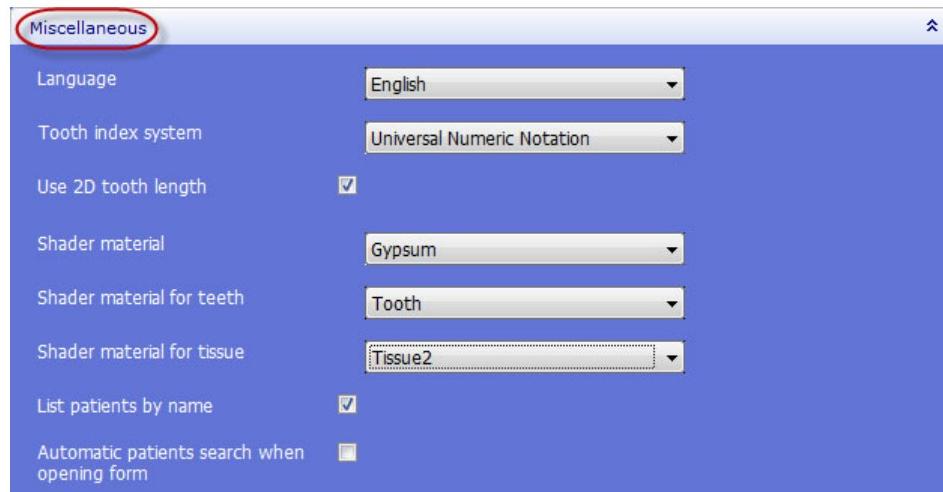
View the **Data folder** tab of the *System Settings* window identifying the path for the OrthoData in it. The OrthoData folder contains the input files for the 3Shape Ortho-applications.

Click the **Browse** button and set the OrthoData path in the *Browse for folder* window that appeared. The default path would be *C:\Program Files\3Shape\OrthoData*.



17.1.4 Miscellaneous

In this tab you can choose the desired **Language** for the program (English, French etc.).



Select the appropriate **Tooth index system** out of the four possible options: **Universal Numeric Notation, FDI Notation, Haderup Notation** and **Palmer Notation**.

Universal Numeric Notation:

Permanent Teeth																	
upper left									upper right								
16	15	14	13	12	11	10	9		8	7	6	5	4	3	2	1	
17	18	19	20	21	22	23	24		25	26	27	28	29	30	31	32	
lower left									lower right								

FDI Notation:

Permanent teeth															
upper right								upper left							
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
lower right								lower left							

Haderup Notation (mostly used in Scandinavian and Eastern Europe countries):

8+	7+	6+	5+	4+	3+	2+	1+	+1	+2	+3	+4	+5	+6	+7	+8
8-	7-	6-	5-	4-	4-	2-	1-	-1	-2	-3	-4	-5	-6	-7	-8

Palmer Notation:

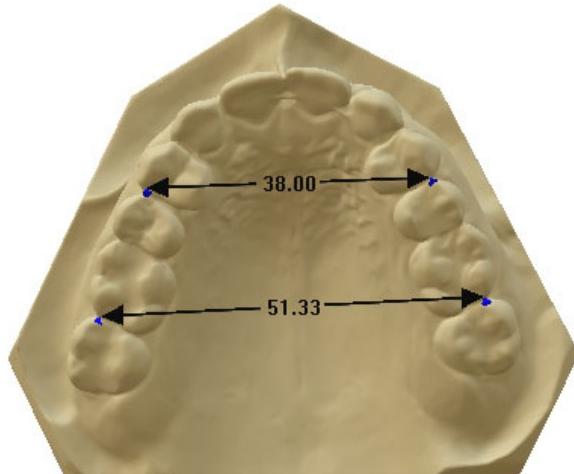
87654321	12345678
87654321	12345678

In the Ortho System, the mouth's quadrants are identified using the following convention:

- **UR** for Upper Right
- **UL** for Upper Left
- **LR** for Lower Right
- **LL** for Lower Left

Thus, the Upper Right Central Incisor is called **UR1** according to the Palmer notation.

Check the **Use 2D tooth length** checkbox to employ the traditional two-dimensional measuring system, which would enable measuring dental distances using the user point-of-view as a measuring plane.



The method for placing the 2D (38.00) length looks identical to that of the 3D length (51.33)

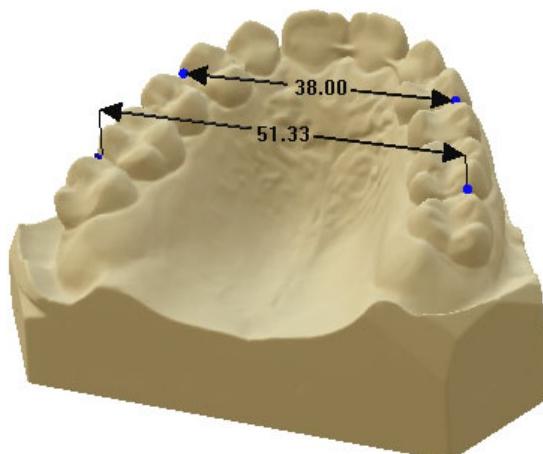
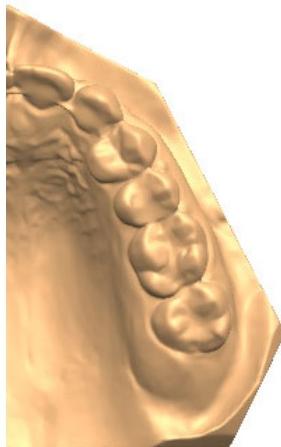


Illustration of the differences between the 2D (38.00) and the 3D (51.33) lengths

Select the appropriate **Shader material** which would define the mode for the virtual texture visualization of the models:



Gypsum



ModelBackface



ModelBackface2



Not specified*

* If you prefer to leave the shader material as **Not specified**, then the system will automatically display the **Choose** button that you can click to get the color map and select the shader (color) of your own choice for the models.

Select the **Shader material for teeth** and **Shader material for tissue** to define the mode for the virtual texture visualization of the teeth and tissue.

List patients by name – when checked, sorts the patients by name, otherwise, by ID.

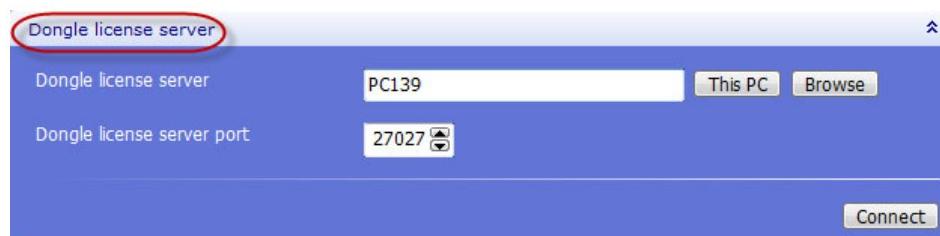
Automatic patients search when opening form – when checked, OrthoAnalyzer automatically displays the list of patients when entering the *Open patient form* (so you don't have to press **Search**).

17.1.5 Dongle Licence Server

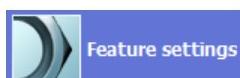
Click the **Browse** button and specify the dongle license sever, selecting it in your network places.

To set your current PC as the dongle license server for the 3Shape Ortho applications, click **This PC**.

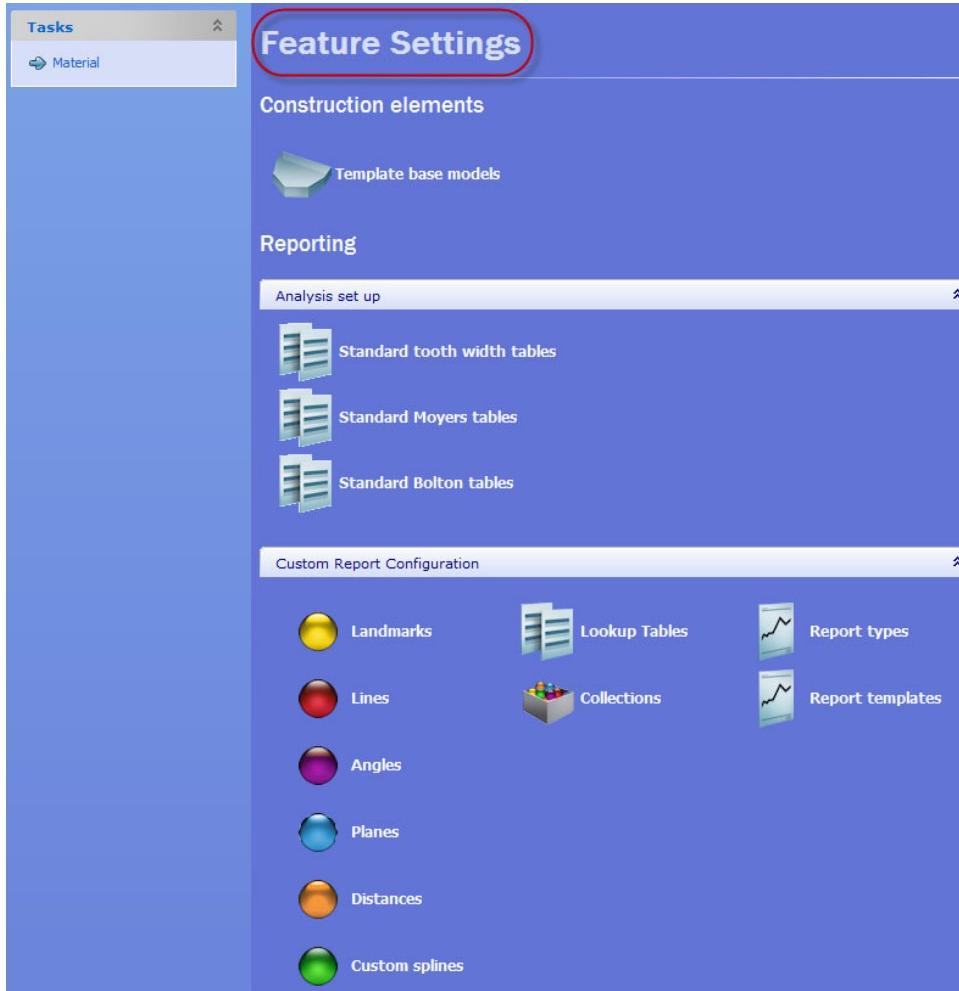
Specify the number of the **Dongle license server port** and click **Connect**.



17.2 Feature Settings



As soon as you click the **Feature settings** icon, the main window opens up displaying the two main sections: **Construction elements** and **Reporting**. The **Tasks** menu contains one task - **Material**. See chapters below for the detailed description of the sections.



17.2.1 Construction Elements



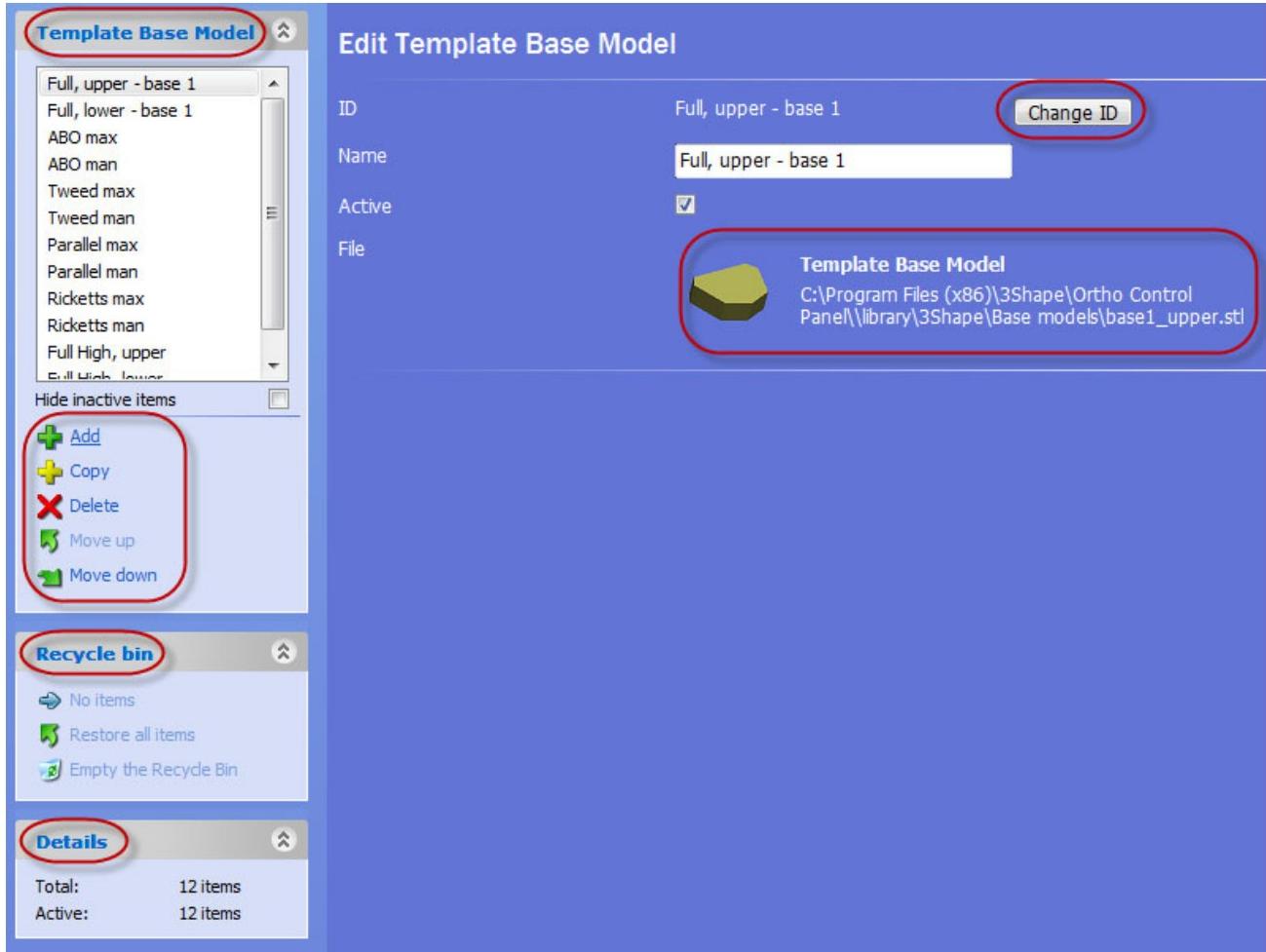
The **Construction elements** section contains the **Template base models** tab where you can edit the template base model. Click on the icon to perform the operation.

When you take a look at the window that has opened up (see image below), you will see the following sections:

Template base model – Enlists entries for the template base models.

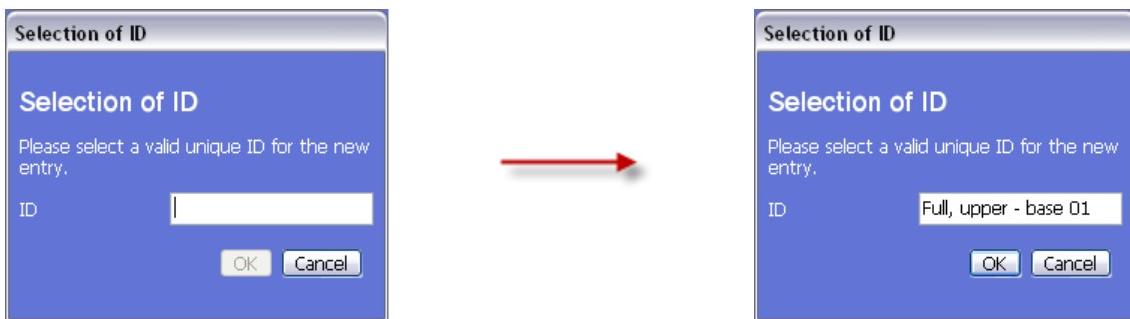
Manipulation field (Add/Copy/Delete/Move up/Move down) - enlists the actions you may apply to the template base models.

Recycle bin - Navigates the deletion and restoration process regarding the template base models entries.
Details - Show the quantity of all the template base models (total) and the only active ones (active).



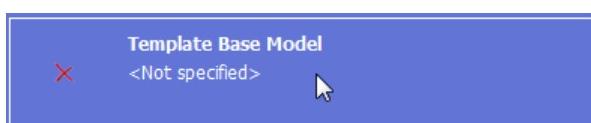
To add a new template base model, click **Add**. The *Selection of ID* box appears, asking you to insert a valid unique ID for the new template base model, which can involve any alphanumeric combination, except for the ones already present in the list.

As soon as ID is specified, the main window transfers to the *Edit Template Base Model* (see image above).



The system automatically identifies the model ID with its name. Click the **Change ID** button to change the ID specified before.

The upper-base 1 model is marked as **Active**, together with 11 other items on the list, which is reflected in the **Details** tab.



The path for the current base model entry is not specified at first. To specify it, move the cursor to the **Template Base Model <Not specified field>** (the white box will circle it to make it active) and click the field. The *Open* window will appear asking for the file name for the base.

The default path for the base templates is specified opposite to the schematic image of the model selected (see image above). The templates are located in the *Base models* folder in the 3Shape OrthoAnalyzer library.

As soon as one of the templates is specified (in our case, the upper model), go on to add the second template for the virtual cast, if necessary. Start with the  **Add** operation, as before.



Note that the template base models are shown in different colors for you to associate between the upper and the lower bases easily.

Select the **Hide inactive items** checkbox to see only the active templates in the template base list.

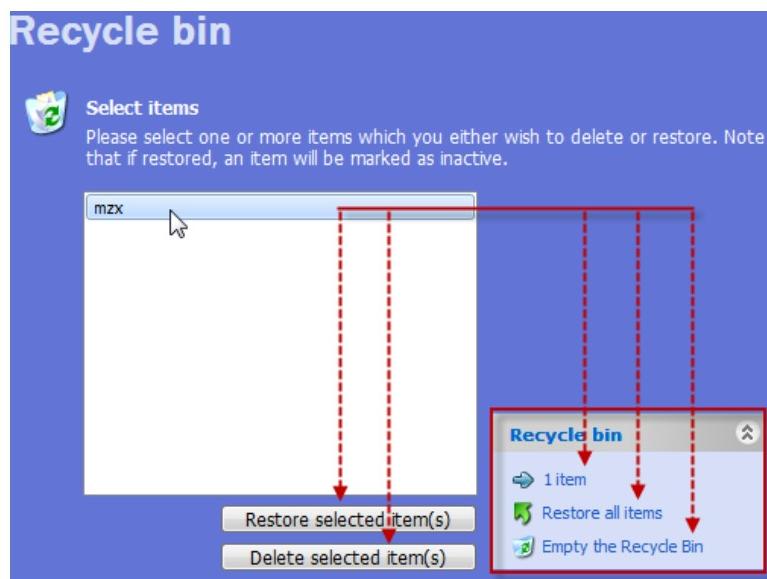
To copy a template base model, select the model to be copied and click  **Copy**.

To delete a template base model, select it and click  **Delete**.

To move a template base model up in the list, select it and click  **Move up**.

To move a template base model down in the list, select it and click  **Move down**.

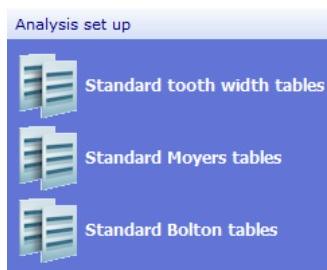
Follow the scheme below to navigate the various options in the **Recycle bin**:



17.2.2 Reporting

The **Reporting** section contains:

- **Analysis set up**
- **Custom Report Configuration**



The **Analysis set up** tab deals with the setup of the following standard analysis tables:

- **Standard tooth width tables**
- **Standard Moyers tables**
- **Standard Bolton tables**

Click on any of the icons to begin editing. The image below illustrates the editing of the **Standard Bolton tables**. The **Standard tooth width tables** and the **Standard Moyers tables** are edited in the same way.

Bolton Ideal Ratios Table

Edit Bolton Ideal Ratios Table

Anterior table

Maxilla	Mandible
40	31.8
40.5	32.2
41	32.6
41.5	33
42	33.3
42.5	33.7
43	34.1
43.5	34.5
44	34.9
44.5	35.3
45	35.7
45.5	36.1
46	36.5
46.5	36.9
47	37.3
47.5	37.7
48	38.1

Overall table

Maxilla	Mandible
85	78
86	78.9
87	79.9
88	80.8
89	81.7
90	82.6
91	83.5
92	84.5
93	85.4
94	86.3
95	87.2
96	88.1
97	89
98	90

Details

Total: 1 item
Active: 1 item

Recycle bin

- No items
- Restore all items
- Empty the Recycle Bin

Add
Copy
Delete
Move up
Move down

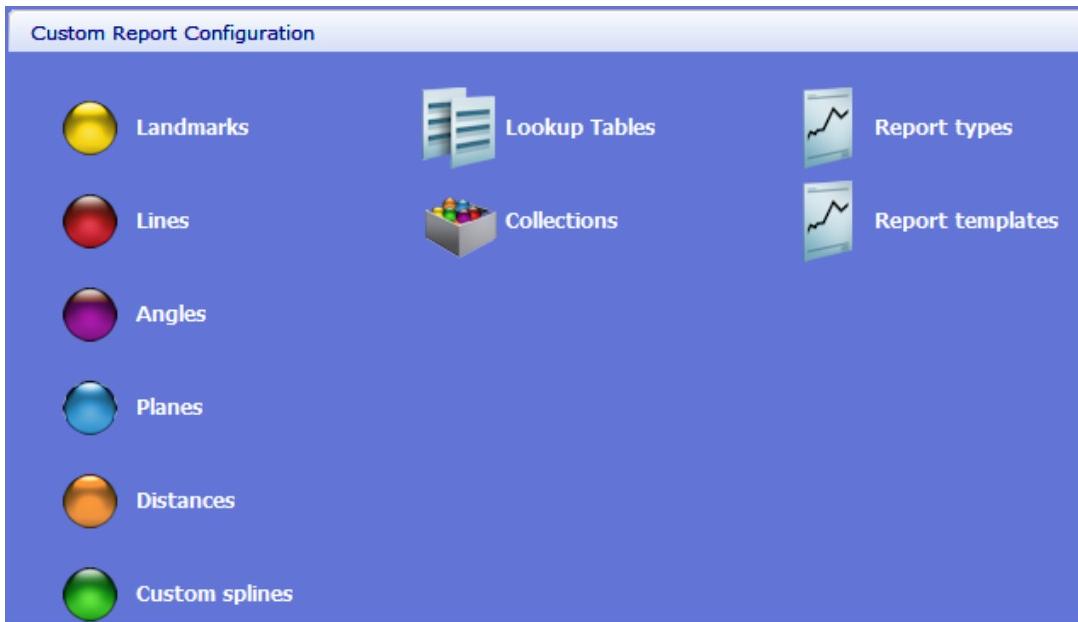
Chinese

Mandible
31.8

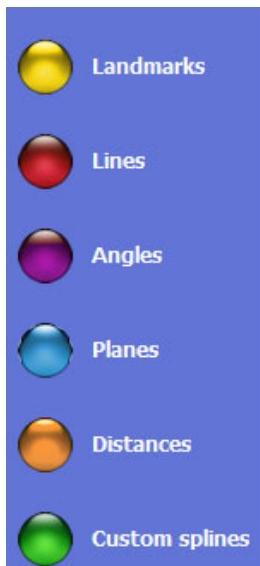
To edit the data in the table, left-click on the cell and insert the necessary numbers. You can also scroll the mouse wheel to move from cell to cell.

Other sections and options of the window are described in details in chapter [Construction Elements](#).

The **Custom Report configuration** tab helps to customize the report.



Custom objects and Primitives



For your customized analyses and report you can setup **Landmarks**, **Lines**, **Angles**, **Planes**, **Distances** and **Custom splines**. Click on any of the colored icons to open an editing window. The image below illustrates the editing of lines.

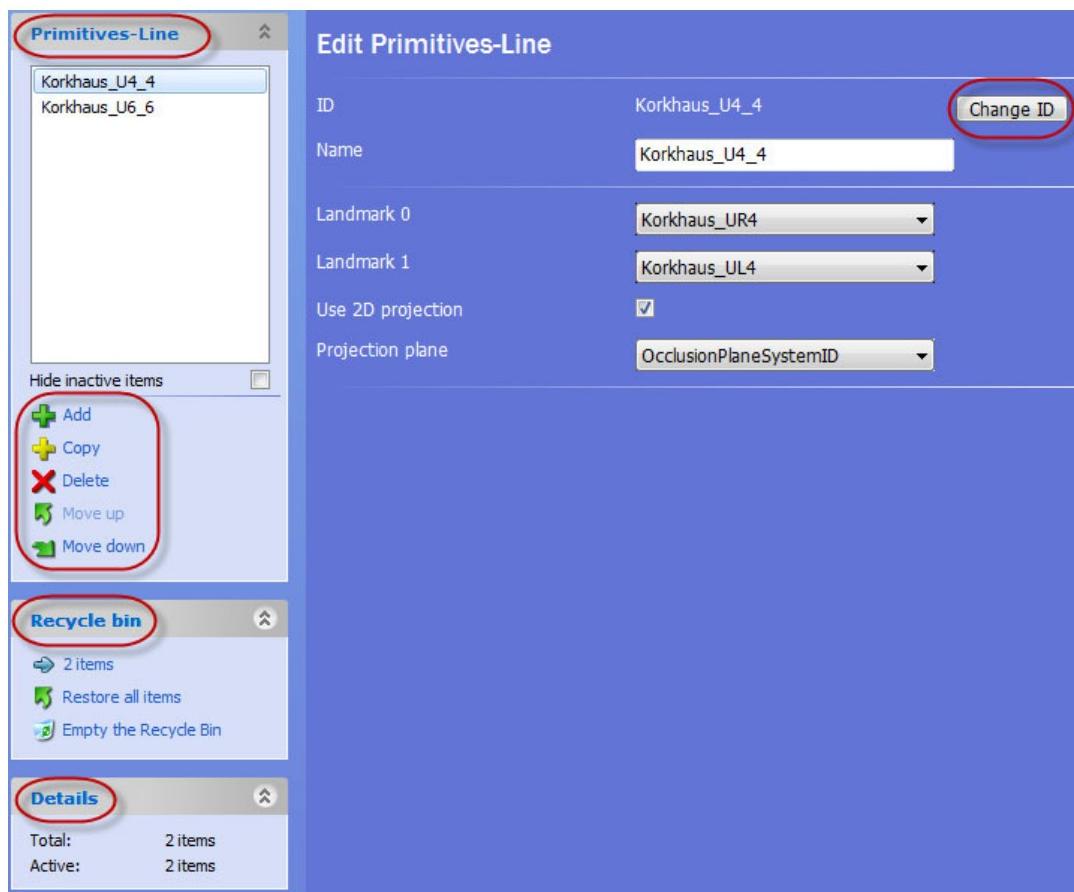
You can add a line by clicking the **Add** button and give a name to your new line. Name your line as desired and select two landmarks (or points) for it (**Landmark 0** and **Landmark 1**).

Select the **Use 2D projection** checkbox to use the projection plane. You can select the type of plane in the **Projection plane** drop-down menu.

Other sections and options of the window are described in details in chapter [Construction Elements](#).

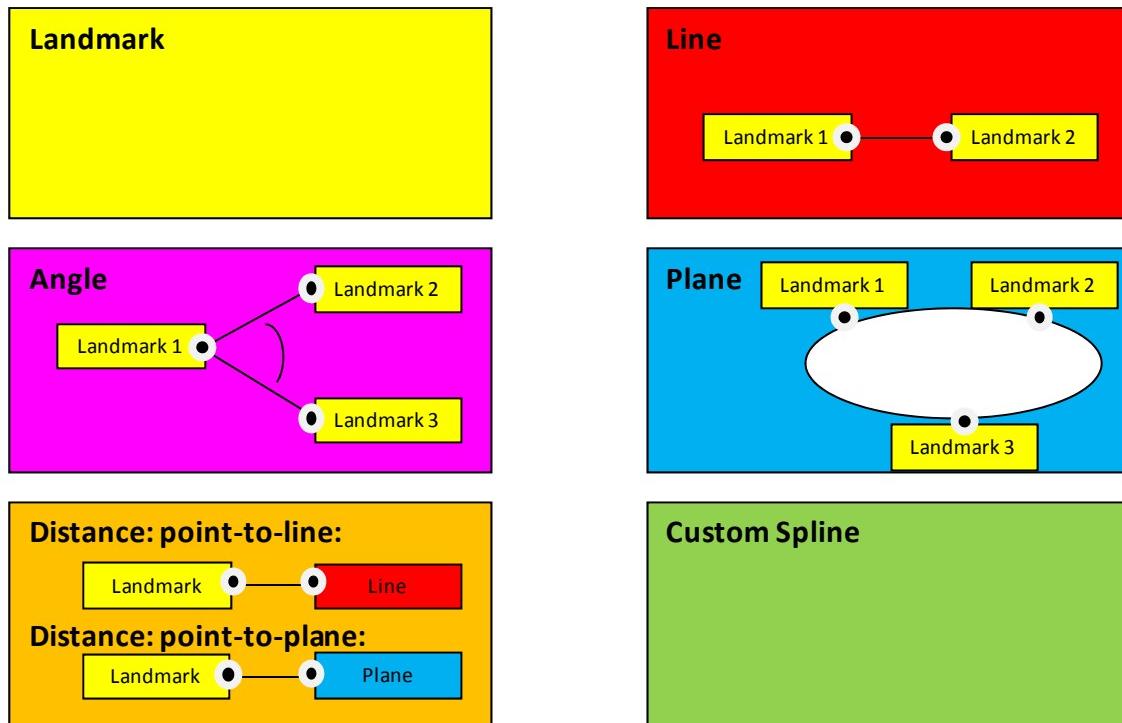
The editing of **Landmarks**, **Angles**, **Planes**, **Distances** and **Custom splines** follows the same principle.

When editing **Distances**, keep in mind that there is a **point-to line** distance and a **point-to-plane** distance that you can choose from the drop-down menu.

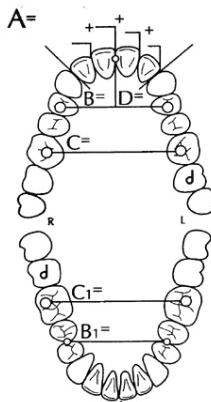
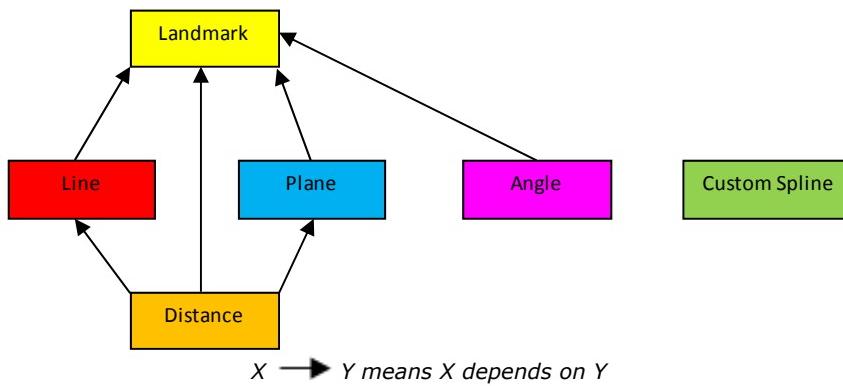


Primitives

The following illustration shows the primitives, i.e. the conceptual relationships between the defined objects:



The dependencies between the primitives are summarized in the following picture:



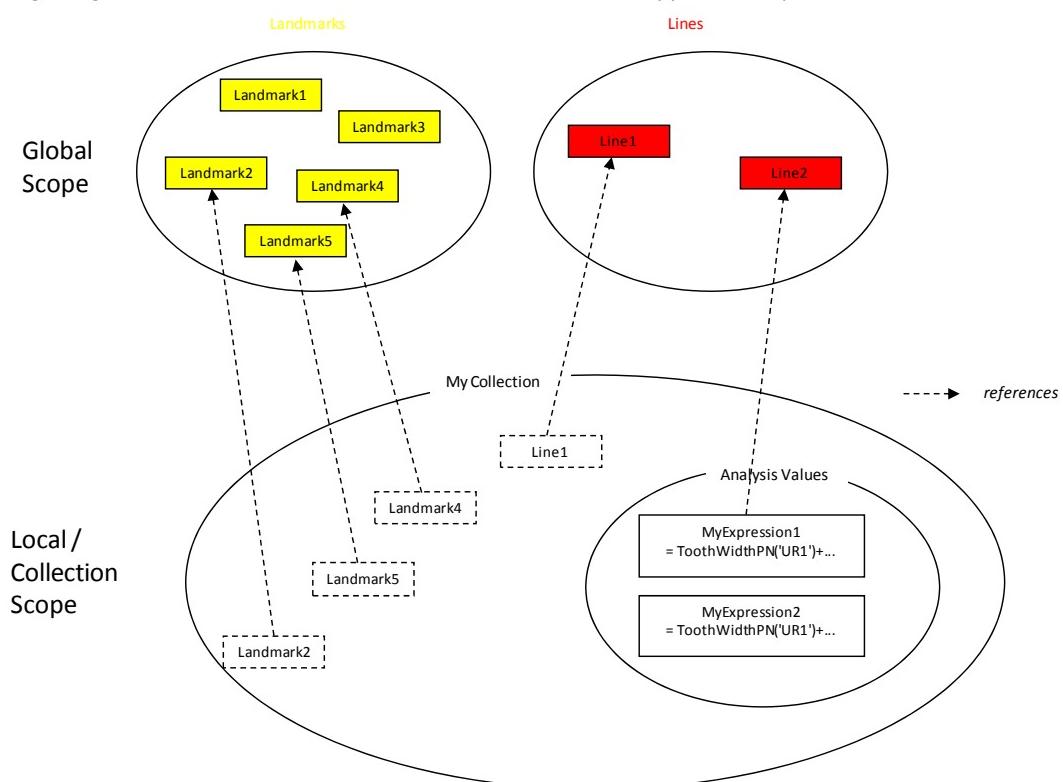
Example: Korkhaus-Schwartz Analysis: a custom analysis has been created in your installed system and we will use it as a working example of the concepts applied to the custom objects and analyses (image to the left).



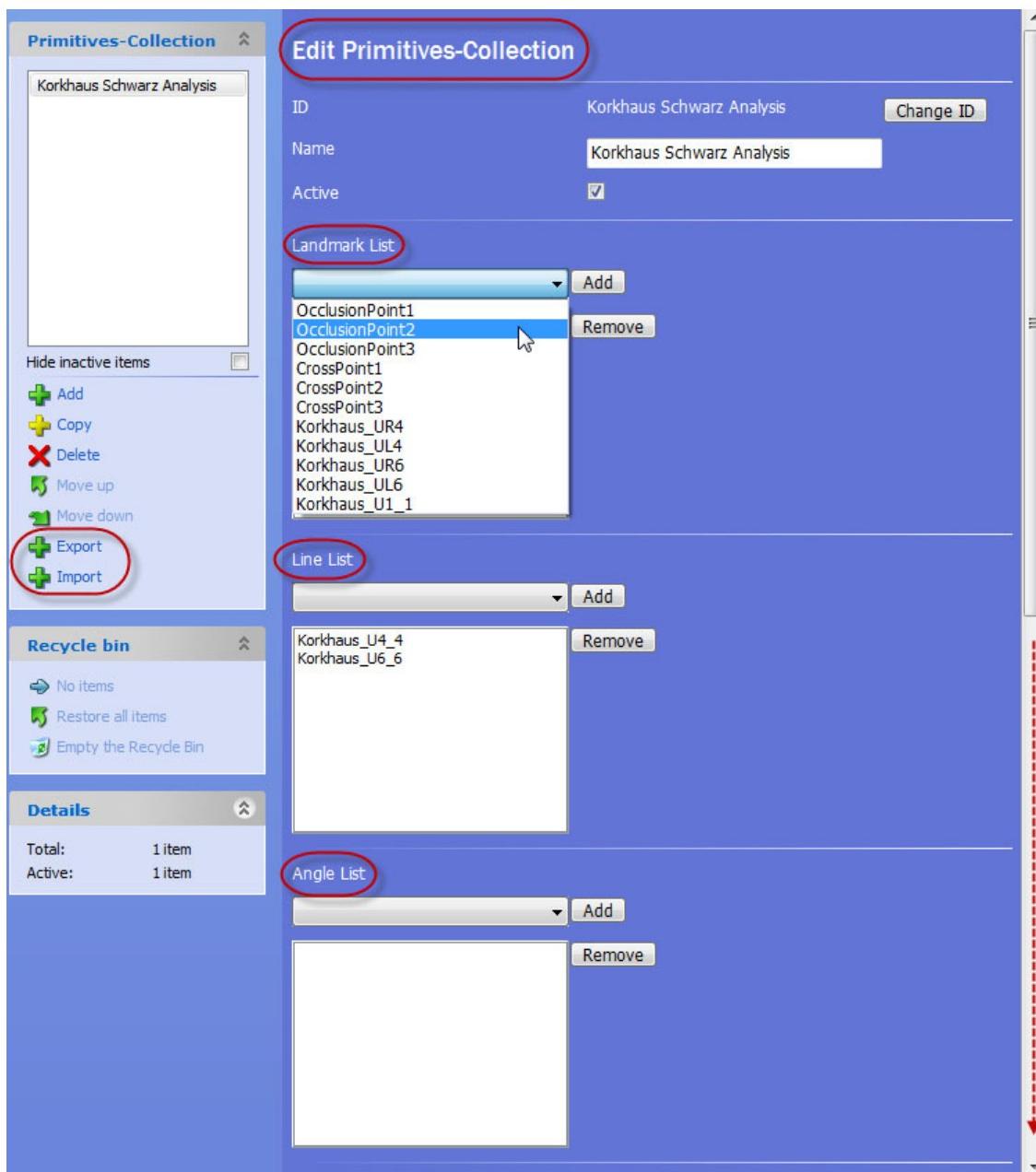
In the **Collections** tab you can create a group of different primitives – landmarks, angles, planes, distances, splines and object values, which will typically correspond to the full analysis you want to create.

Please note that a primitive can be applied in several Collections or analyses.

The following image illustrates collections and how Primitives can be applied to separate Collections:



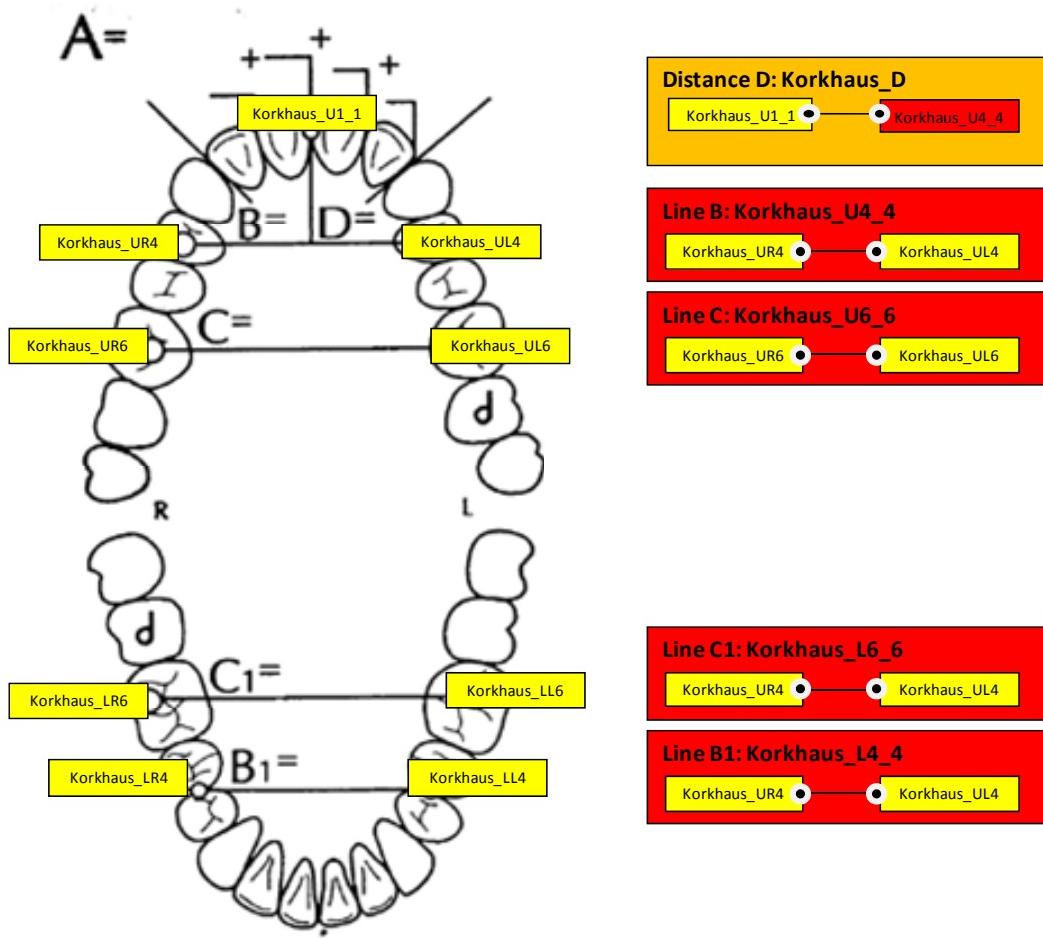
The image below illustrates the *Edit Collection* window with the lists of the primitives. Scroll down to view the rest of the lists.



To create a collection, click the **Add** button and name your collection as desired. Select different elements from the drop down menus and click to add them to your collection. Click to delete an element from the collection. You can **Export** and **Import** the collection with the help of the corresponding buttons (see image above).

Other sections and options of the window are described in details in chapter [Construction Elements](#).

The Korkhaus Schwartz analysis Collection thus includes the following Primitives:



A set of **7 landmarks** set by the user on the specific teeth (e.g. Korkhaus_UR4, Korkhaus_U1_1...)

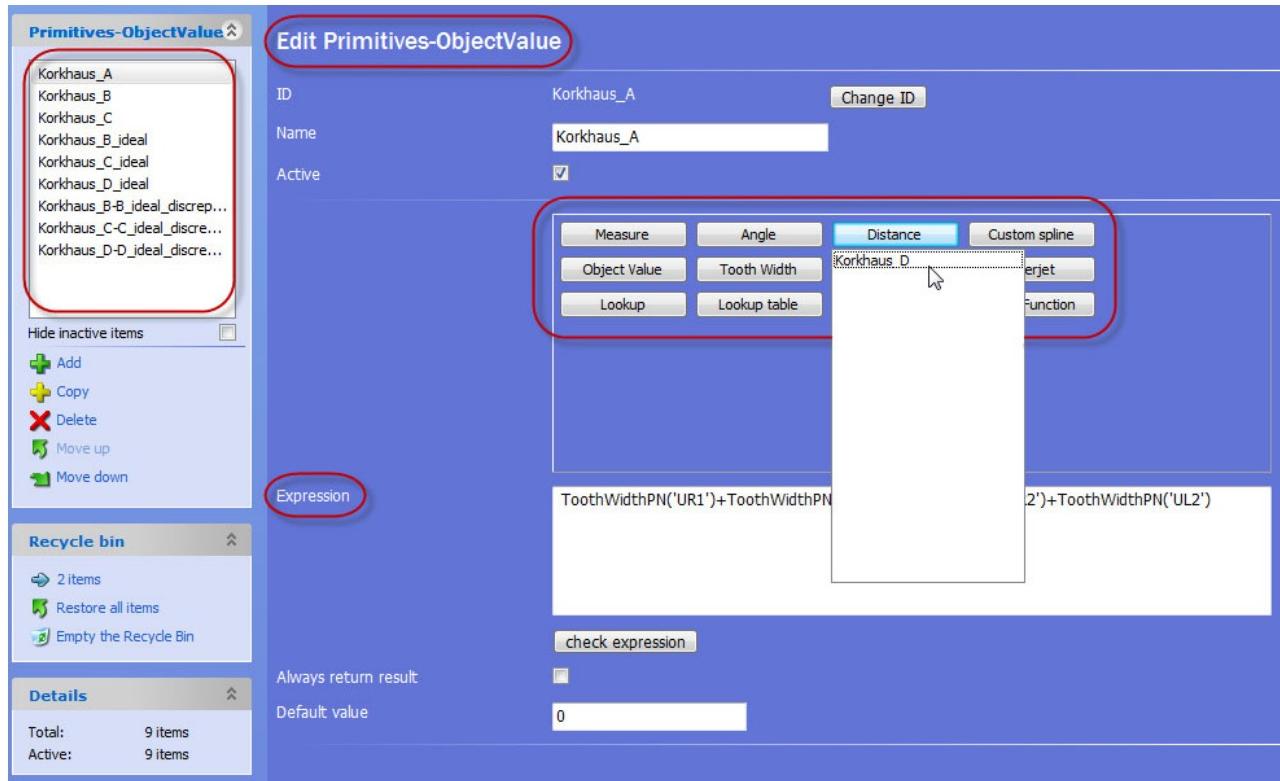
4 lines: Korkhaus_B, defined Korkhaus_U4_4, joining the landmarks Korkhaus_UR4 and Korkhaus_UL4 etc.; and **1**

Distance: Korkhaus_D, which joins the Korkhaus_B line and the landmark Korkhaus_U1_1.

Object Values:



At the bottom of the window there is the **Object Values** button where you can create some fixed values or associate some calculations to the Primitives you have defined in your Collection. The image below illustrates the *Edit Object Values* window that contains the items of the expression and the white field of the expression itself.



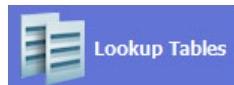
To create a new expression, click the **Add** button and name your collection as desired. Click on the necessary buttons in the table to select the desired items for your expression in the drop-down menu (see image above).

To check if the expression was created correctly, click the **Check expression** button. A small information window will appear informing you whether the expression was created correctly or there was an error. Check the **Always return result** checkbox to return to the default value in case of the expression failure (the **Default value** can be entered below).

Other sections and options of the window are described in details in chapter [Construction Elements](#).

Specifically, the object values defined for the **Korkhaus-Schwartz** analysis are listed below:

- Korkhaus_A: Expression:
ToothWidthPN('UR1')+ToothWidthPN('UL1')+ToothWidthPN('UR2')+ToothWidthPN('UL2')
- Korkhaus_B: Line: Korkhaus_U4_4
- Korkhaus_C: Line: Korkhaus_U6_6
- Korkhaus_B_ideal: Lookup('Schwartz-Korkhaus','B,B1',Korkhaus_A)
- Korkhaus_C_ideal: Lookup('Schwartz-Korkhaus','C',Korkhaus_A)
- Korkhaus_D_ideal: Lookup('Schwartz-Korkhaus','D',Korkhaus_D)
- Korkhaus_B-B_ideal_discrepancy: Expression: Korkhaus_B-Korkhaus_B_ideal
- Korkhaus_C-C_ideal_discrepancy: Expression: Korkhaus_C-Korkhaus_C_ideal
- Korkhaus_D-D_ideal_discrepancy: Expression: Korkhaus_D-Korkhaus_D_ideal



In case you need a lookup table for your expression, go to the **Lookup Tables** tab to open an editing window (see image below).

The screenshot shows the 'Edit Lookup Tables' interface. On the left, there's a sidebar with sections for 'Lookup Tables' (containing 'Schwartz-Korkhaus'), 'Recycle bin' (with 1 item), and 'Details' (Total: 1 item, Active: 1 item). The main area has fields for 'ID' (Schwartz-Korkhaus), 'Name' (Schwartz-Korkhaus), 'Column count' (5), 'Row count' (19), and 'Key's column count' (1). A large table grid is shown with columns labeled A, B,B1, C, C1, and D. The data consists of 19 rows of numerical values. The 'Apply' button is highlighted with a red circle.

A	B,B1	C	C1	D
27	34	43.5	42.5	18
27.5	34.5	44.3	43.3	18.3
28	35	45	44	18.5
28.5	35.5	45.8	44.8	18.8
29	36	46.5	45.5	19
29.5	36.7	47.3	46.3	19.3
30	37.5	48	47	19.5
30.5	38	48.8	47.8	19.8
31	38.5	49.5	48.5	20
31.5	39	50.5	49.5	20.3
32	39.5	51	50	20.5
32.5	40.2	52	51	20.8
33	41	53	52	21
33.5	41.5	53.5	52.5	21.3
34	42	54.5	53.5	21.5
34.5	42.5	55	54	21.8
35	43.2	56	55	22

A Lookup Table with 5 columns and 19 rows was defined with values from the following website:

<http://www.johnsdental.com/articles/ortho/Scwzkork1.htm>

To create a new table, click the **Add** button and name your table as desired (e.g. Schwarz-Korkhaus). Enter the necessary amount of columns and rows in the corresponding fields, choose the amount of key's columns and click **Apply**. After the table has been created, you can modify it by left-clicking on the columns and entering the data.

Other sections and options of the window are described in details in chapter [Construction Elements](#).



Select the **Report types** tab to create/edit the type for your customized report (see image below).

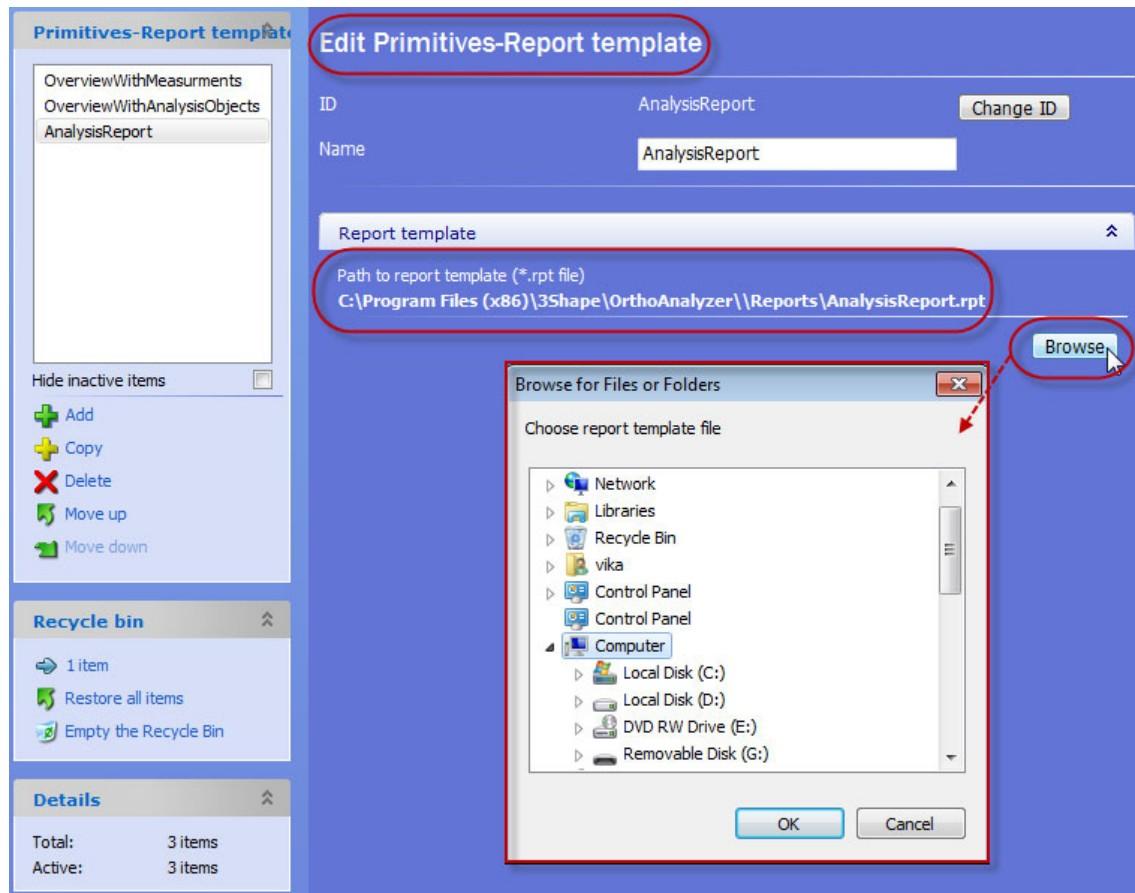
The screenshot shows the 'Edit Primitives-Report type' window. At the top, there's a toolbar with 'Overview', 'Overview with measurements', 'Overview with analysis obj...', and 'Analysis Report'. Below the toolbar, there are buttons for 'Add', 'Copy', 'Delete', 'Move up', and 'Move down'. A 'Recycle bin' section indicates 'No items'. The 'Details' section shows 'Total: 4 items' and 'Active: 4 items'. The main area is titled 'Report options' and contains a section 'Select the items that are to be in the report'. A tree view lists items under 'All': Views (selected), Closed front view, Primitives (selected), Landmarks (selected), Generic landmarks (selected), Lines (selected), Generic lines (selected), and Angles. Under 'Generic landmarks', several items are checked: Occlusion point 1, 2, 3; Cross point 1, 2, 3; Korkhaus_UR4, UL4, UR6, UL6, U1_1; Measure 1; and Korkhaus_U4_4, U6_6.

To create a new report type, click the **Add** button and enter a name for your type report. Choose the **Default template** from the drop down menu (the templates are created in the **Report templates** tab described below). Select the items that are to be in the report from the tree by selecting the checkboxes with the mouse. Scroll down to view the entire tree.

Other sections and options of the window are described in details in chapter [Construction Elements](#).



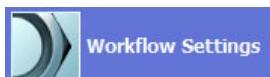
To create a report template, go to the **Report templates** tab. There appears a window similar to the one illustrated below.



To create a new report template, click the **Add** button and enter a name for your new template. Click the **Browse** button to select the path to the report template from the *Browse for Files or Folders* window that appears on the screen.

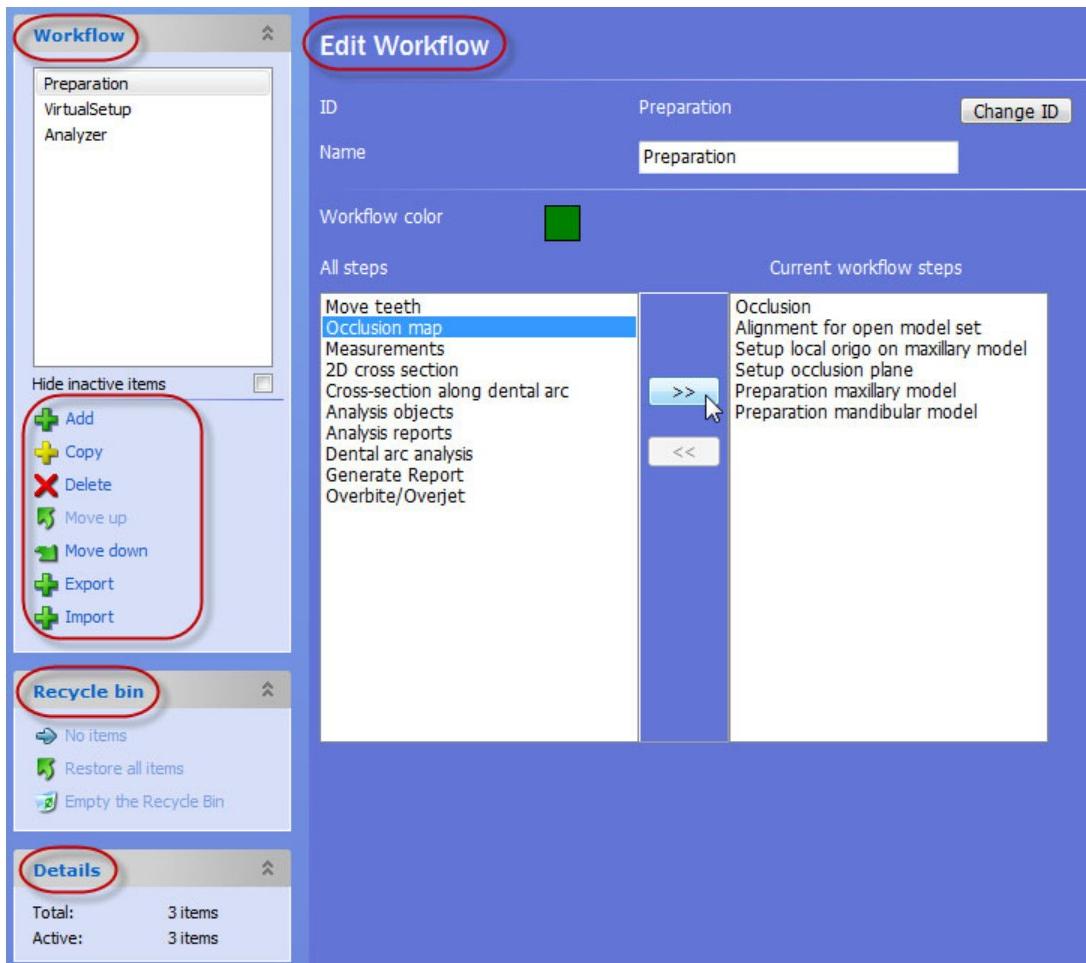
Other sections and options of the window are described in details in chapter [Construction Elements](#).

17.3 Workflow Settings



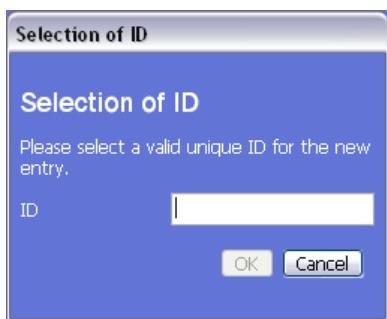
As soon as you click the **Workflow settings** icon, the main window opens up offering you to edit the workflow steps (see image below).

The application allows you to setup a number of customized workflow wizards with predefined operational steps. This cleans up the software interface and organizes steps and operations for your own use.



In the **Workflow settings** you can use and edit the pre-made wizards or add your new wizards.

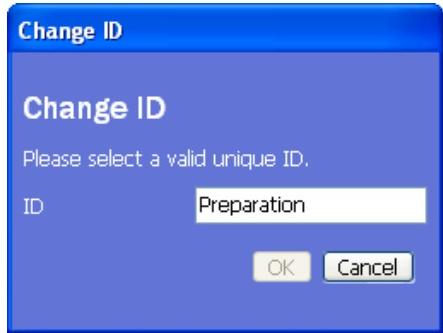
- **Adding a new wizard**



When creating a new wizard, click the **Add** button to add the wizard ID in the appeared *Selection of ID* window.

Once the new wizard is added it appears in the **Workflow** list on the left. Inactive wizards can be hidden from the list by selecting the required wizard and ticking the **Hide inactive items** checkbox. All available steps of a wizard are show under **All steps** listing while the wizard remains selected.

Select the required steps for the created wizard and transfer them to the **Current workflow steps** list on the right with the **>>** button. Use the **<<** button to remove the selected steps from the **Current workflow steps** list if needed.



The customized workflow wizard name can be edited by selecting it from the **Workflow** list and clicking the **Change ID** button.

You can specify color of the selected wizard by clicking the **Workflow color** cube and selecting the desired color from the available palette.

- **Other operations**

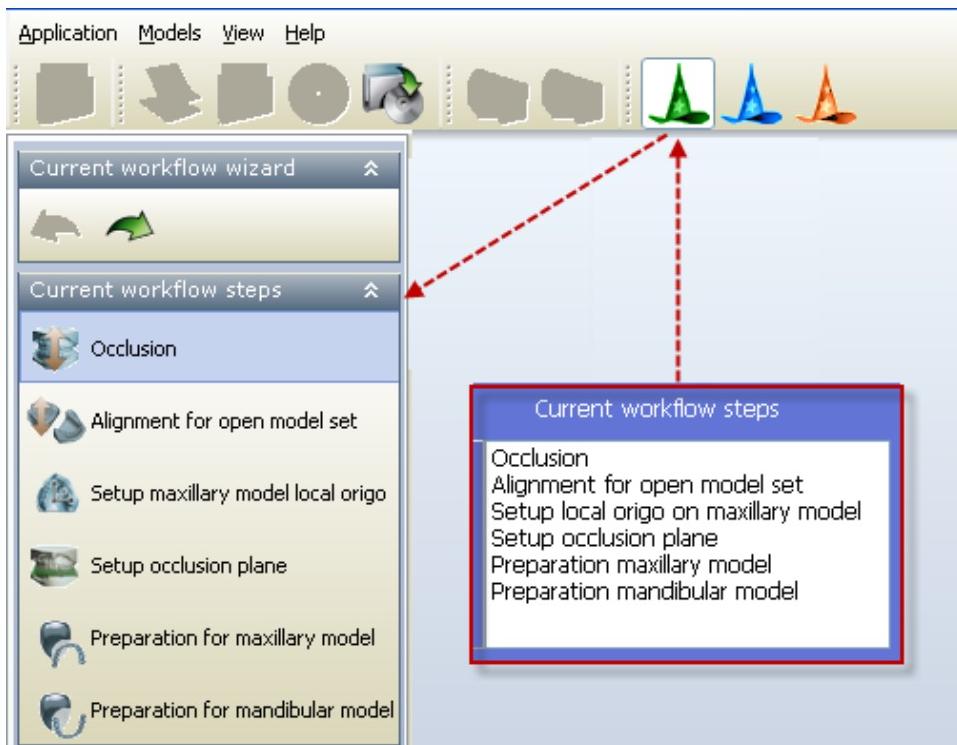
With the other operations you can **Copy**, **Delete**, **Move up** and **Move down** the selected wizards. The deleted wizards are kept in the **Recycle bin**. You can either restore them or empty the [Recycle bin](#).

The **Export** and **Import** buttons allow you to easily export or import your wizard settings to/from a *.3ml file.

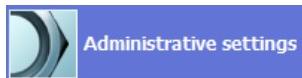


The supplied Ortho software installs 3 pre-made customized workflow wizards by default. As shown in the table to the left, the wizards are represented by the hat icons of varying color and are located in the Main toolbar of OrthoAnalyzer.

Only the sequence of steps defined for the wizard in the Ortho Control Panel appears in the OrthoAnalyzer interface on the wizard icon selection. The following image shows the operational steps of the default **Preparation** wizard in the Ortho Control Panel and OrthoAnalyzer interfaces:



17.4 Administrative Settings

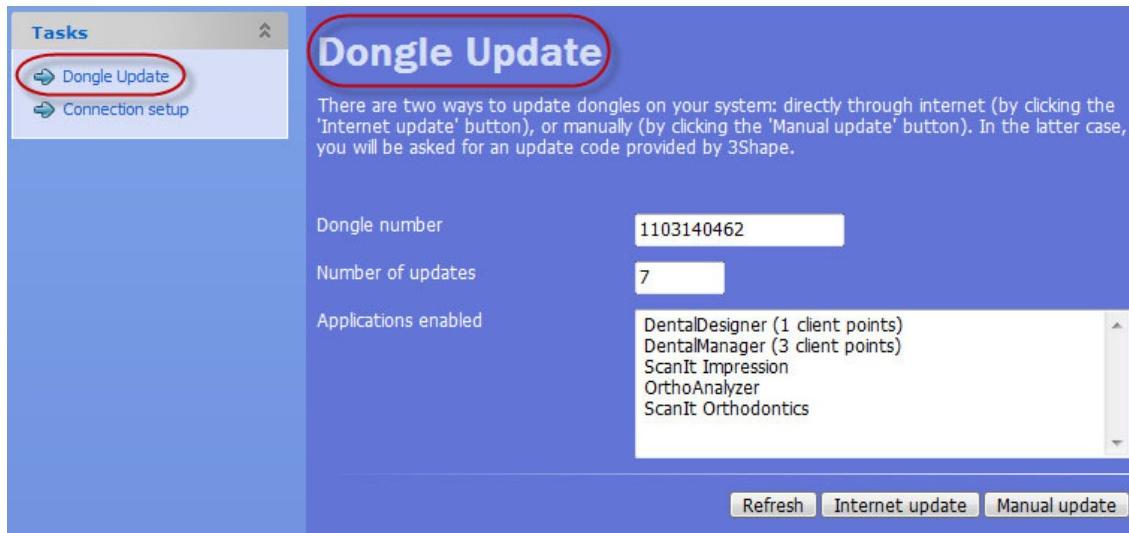


As soon as you click the **Administrative settings** icon, the main window opens up displaying the **Dongle update** option (see image below). Click on it to start updating your dongle.



After you have clicked the **Dongle update** tab, the main window opens up allowing you to update the dongle in two ways (see image below):

- Via internet (by clicking the **Internet update** button).
- Manually (by clicking the **Manual update** button). In this case the *Manual update* window will pop up asking you for the update code provided by 3Shape.



Click the **Refresh** button to update the following information:

Dongle number – The unique number of your dongle.

Number of updates – The number of updates performed so far.

Applications enabled – The applications available on your dongle.

In order to update dongles via internet, click on the **Connection setup** button in the **Tasks** menu. The image below illustrates the window that appears on the screen.

The **Server URL** field must contain the address pointing at the 3Shape dongle server. If you are behind the proxy server, enter the appropriate settings in the **Proxy settings** section.

Click **Test connection** button to verify whether the connection was successful.



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About 3Shape A/S

3Shape A/S is a Danish company specializing in the development and marketing of 3D scanners and CAD/CAM software solutions. These are used for the creation, processing, analysis and management of high-quality 3D data.

Implementing 3Shape's solutions brings **significant benefits in terms of quality, productivity and creativity** to complex manufacturing processes, where the handling of physical objects is critical.

With more than 65 full-time developers dedicated to dental solutions, we have unmatched development and innovative power, thereby making the vision of fully digital dental processes a reality.

Thousands of dental restorations are produced every day by customers using 3Shape's 3D scanners, CAD modeling software and production management systems in more than 50 countries.

3Shape A/S is a privately-held Danish company, whose headquarters are in Copenhagen, with development teams in Denmark as well as the Ukraine. In early 2009, we opened Sales and Support Offices in New Jersey, USA and Shanghai, China.

For further information on 3Shape A/S and the Ortho System please visit:
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